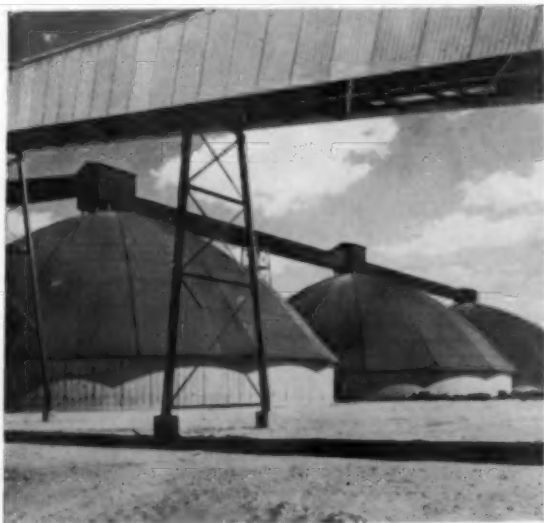


AGRICULTURAL

Chemicals



AUGUST 1957



GREATER YIELDS
for
FERTILIZER MANUFACTURERS
and
FARMERS

NATIONAL POTASH supplies the
fertilizer manufacturer with
coarse and standard grade
muriate of potash that is
dust-free, free-flowing and
of uniform K_2O content.

These qualities enable the
manufacturer to offer a better
product to the farmer
for his plant food dollar.

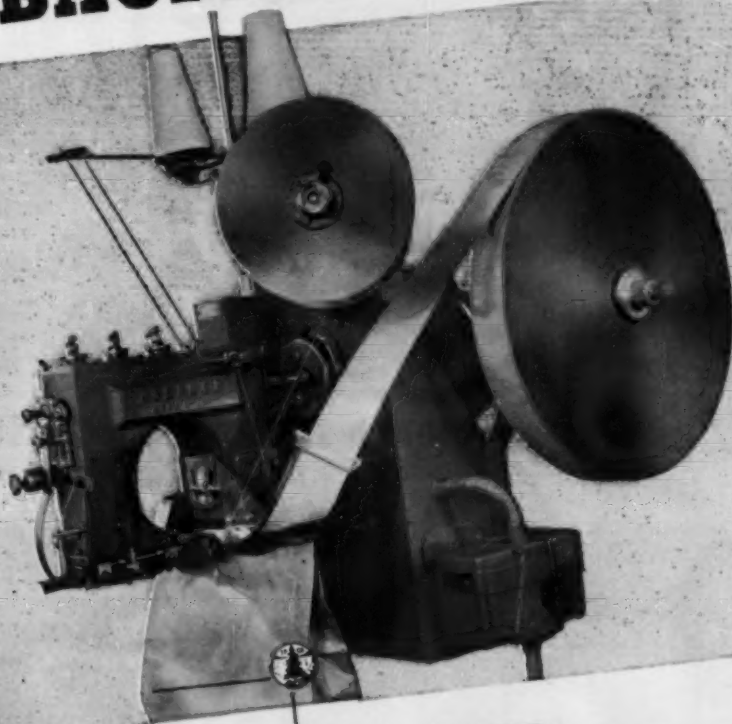


NATIONAL
POTASH COMPANY

205 EAST 42nd ST. • NEW YORK 17, N. Y.

Send NOW for your copy of this NEW Book!

THE LATEST AND MOST VERSATILE BAGPAK CLOSER



International Paper COMPANY
BAGPAK DIVISION 220 EAST 42ND STREET, NEW YORK 17, N. Y.

BRANCH OFFICES: Atlanta • Baltimore • Boston • Chicago • Cincinnati • Cleveland • Dallas • Denver • Kansas City, Mo. •
Los Angeles • Minneapolis • New Orleans • Philadelphia • San Francisco • San Juan • St. Louis

This brochure gives inside details of the sensational, new bag closing machines just introduced by the BAGPAK DIVISION of International Paper. (Orders coming in from all over the U.S.!)
Write for your copy today—or send in this coupon.

Bagpak Division, International Paper Company
220 East 42nd St., New York 17, N. Y.

Please send me copy of your New Bagpak® Closer Brochure. I understand there is no obligation involved.

Name

Company

Address

AC-8

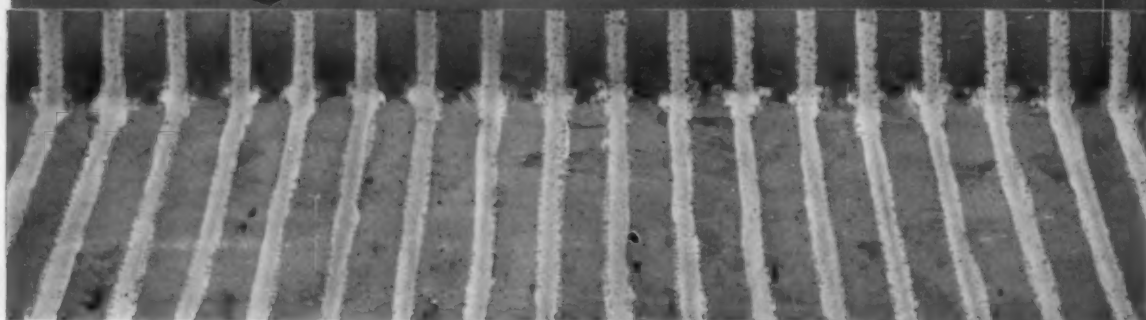
HEALTHY SOIL . . .
HEALTHY PROFITS!



HIGH GRADE MURIATE OF POTASH

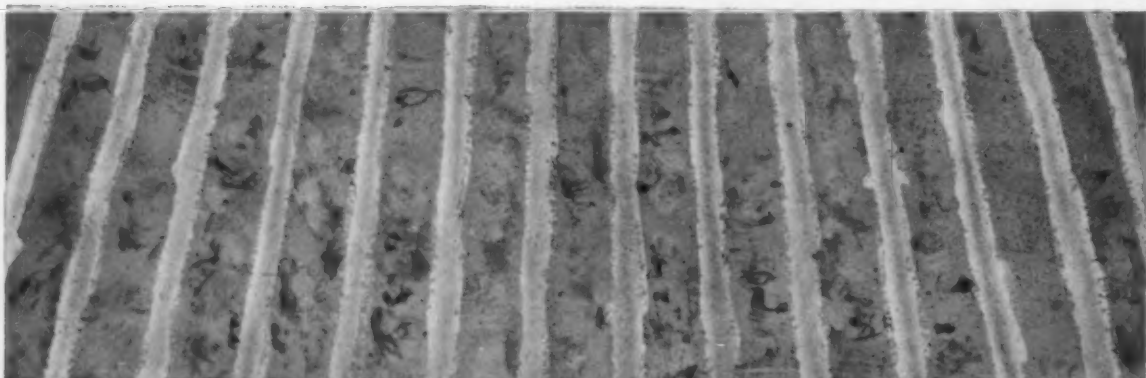
Duval Muriate of Potash—A vital element at low cost
for healthy soil and healthy profits.

HIGH ANALYSIS DEPENDABLE SUPPLY UNSURPASSED SERVICE



DUVAL SULPHUR and POTASH COMPANY

MODERN PLANT AND REFINERY AT CARLSBAD, NEW MEXICO



ASHCRAFT-WILKINSON COMPANY

Address communications to:

Exclusive Distributors

Atlanta, Georgia • Cable Address: Ashcraft

WINFORD, VA. • CHARLESTON, S.C. • TAMPA, FLA. • JACKSON, MISS. • COLUMBUS, OHIO • MONTGOMERY, ALA. • DES MOINES, IOWA

This Month's Cover

Over-all view of Geigy's handsome new administrative offices and laboratories in suburban Ardsley, N. Y. Bottom pictures show the white marble main entrance hall, and a typical executive office. Story on suburban trend page 37.

Vol. 12, No. 8

August, 1957

AGRICULTURAL

Chemicals

ARTICLES

PROTECTANTS FOR FARM STORED GRAIN	28
<i>By Donald A. Wilbur</i>	
CALCIUM PHOSPHATES AS SOURCES OF PLANT NUTRIENTS (Conclusion)	30
UNDER SEPARATE COVER	33
<i>By P. W. Oman</i>	
CONTRIBUTIONS TOWARD CHEMICAL CONTROL OF WHEAT SMUT....	35
<i>By C. S. Holton</i>	
PRILLING AMMONIUM NITRATE AT BREA	38
RECENT DEVELOPMENTS IN SOIL FUMIGATION FOR CONTROL OF NEMATODES	40
<i>By Bert Lear</i>	
THE AMERICAN POTASH INSTITUTE	45
PACIFIC ESA ELECTS L. S. JONES CHAIRMAN	47
1956 FUNGICIDE TESTS (Conclusion)	49

FEATURES

IN THE SPOTLIGHT THIS MONTH	11
INDUSTRY CALENDAR	22
EDITORIALS	26
FERTILIZER VIEWS AND NEWS	53
THE LISTENING POST	57
<i>By Kelvin Dorward and Paul Miller</i>	
WASHINGTON REPORT	62
<i>By Donald Lerch</i>	
TECHNICAL SECTION	65
INDUSTRY NEWS	69
SUPPLIERS' BULLETINS	85
PROFESSIONAL DIRECTORY	101
CLASSIFIED ADVERTISING	103
ADVERTISER'S INDEX	105
TALE ENDS	106

Publisher
Wayne E. Dorland

Editor
Eleonore Kanar

Associate Editor
Richard McNally

Advertising Manager
Ralph Dorland

Eastern District Manager
Roger Appleby

Midwestern Manager
Robert F. Garty

Circulation
David Tryon

Editorial Advisory Board
Dr. Alvin J. Cox
Lea S. Hitchner
Dr. S. E. A. McCallan
Dr. Charles Palm
Dr. Colin W. Whittaker



PUBLISHED monthly on the 1st, by Industry Publications, Inc.

ADVERTISING and Editorial Office, P. O. Box 31, Caldwell, New Jersey.

PUBLICATION Office: 123 Market Pl., Baltimore, Md. CHICAGO ADDRESS: P. O. Box 135, Park Forest, Ill. SKYLINE 6-4499.

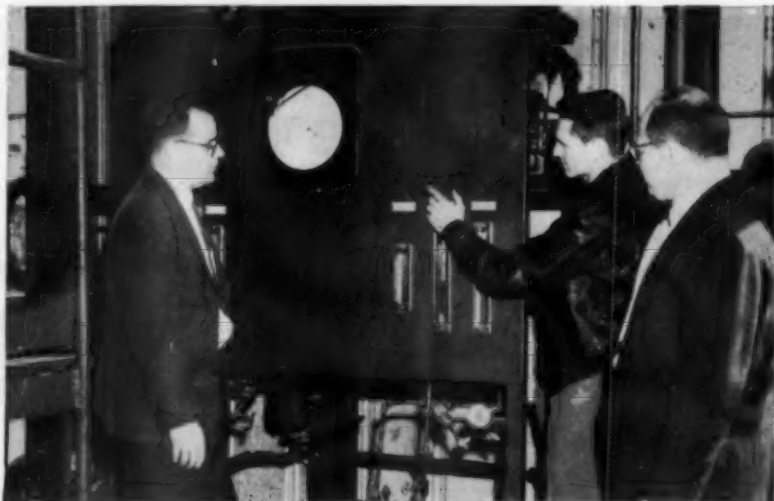
ENTERED as second-class matter November 4, 1949 at the Post Office at Baltimore, Md., under the Act of March 3, 1879.

SUBSCRIPTION RATES: United States, 1 year, \$3.00; 2 years, \$5.00. Canada and Pan American countries,

1 year, \$4.00; 2 years, \$7.00. All other foreign countries, 1 year, \$9.00; 2 years, \$15.

SINGLE COPIES: current issue: \$0.50; all back numbers \$1.00. Postage and handling charges for foreign countries on single copies: \$1.00. Claims for missing numbers will not be allowed if received more than 60 days from date of mailing. No claims allowed from subscribers arising from failure to notify the Circulation department of a change of address, or because a copy is "missing from files."

ADVERTISING RATES known on request. Closing date for copy—5th of month preceding month of issue.



Finding ways to produce higher analysis mixed fertilizer with low-cost raw materials is the primary aim of Spencer Chemical Company's new mixed fertilizer demonstration unit (see story below).

first test results now available to fertilizer manufacturers from Spencer's demonstration plant

EXCITING things are happening at a pilot-scale fertilizer demonstration plant located near Pittsburg, Ks. Owned by Spencer Chemical Company of Kansas City, Mo., producer of SPENSOL Ammoniating solutions, this pilot plant is being used to investigate processing improvements in manufacturing granulated fertilizers.

New Information Available

For the first tests, Spencer chose common grades that would utilize a wide spread of plant food sources from commercially-available raw materials.

At the present time, Spencer is running further tests on these grades to compare operating conditions with those of a full-scale plant.

Using a random schedule, four runs have been made on each of four grades to check the granulation characteristics. The grades are:

12-12-12	10-20-20
16-20-0	8-24-8

Additional grades that have been successfully granulated are: 18-18-18, 7-28-28, 22-22-0, and 12-48-0.

Production Methods & "Problem" Grades To Be Studied

In the future, Spencer will work on improved ways to add liquids to the ammoniator granulator.

Spencer also plans to tackle corrosion problems in their research work, as well as devoting a great deal of time to research on two grades that are causing a number of problems for many fertilizer manufacturers: 5-20-20 and 6-24-12.

Although Spencer does not produce mixed fertilizer, they have long been a producer of Nitrogen materials for the fertilizer industry.

Since Spencer Chemical Company has a major interest in the future of the industry, it hopes to help manufacturers discover ways to produce the best possible product in the most efficient way.

Write For Test Results

Whether or not you, as a fertilizer manufacturer, use SPENSOL in producing mixed fertilizer, you can get a complete report on the results of Spencer's demonstration plant tests by writing direct to:

Spencer Chemical Company,
Agricultural Technical Service,
Dwight Bldg., Kansas City 5, Mo.



SPENCER CHEMICAL COMPANY, Dwight Bldg., Kansas City 5, Mo., District Sales Offices: 412 Candler Bldg., Atlanta, Ga.; First National Bank Bldg., Chicago, Ill.; Union Planters National Bank Bldg., Memphis, Tenn.

America's Growing Name in Chemicals

AGRICULTURAL CHEMICALS

Take a good look at your multiwall bag!



**IS
YOUR
MULTIWALL
BAG
"DATED"
?**

Like women's bathing suits, multiwall bags also reveal the passing of time.

Is your bag a vivid, modern example of your business vitality... or is it dull, drab and lacking in appeal?

Is your bag the ideal package for your product, in size and construction, or is it a carry-over from the past?

KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary
630 Fifth Avenue, New York 20, N. Y.
Daily News Bldg., Chicago 6, Ill.

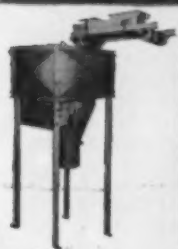
Plants at St. Marys, Georgia and Gilman, Vermont
Sales Agents for The Kraftpacker

To compete successfully in your markets, your package should be as up-to-date as this issue of the magazine... if it isn't, it's a good idea to send for us.

Dependable as a service for 3 generations



- ☐ We are interested in improving our bag.
- ☐ We are interested in your Kraftpacker.



KRAFTPACKER

...fills practically any free-flowing material—fast—and with more accuracy than any open mouth bag filling machine of its type in use today—regardless of price!

NAME OF COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____ PRINCIPAL _____

PRODUCT MFD. _____ AC



MURIATE OF POTASH for the PLANT FOOD INDUSTRY

THIS symbol stands for high-grade coarse and uniform Muriate of Potash (60% K_2O minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K* Muriate for the plant food industry.

*Trade Mark

Southwest Potash Corporation

41 BROADWAY • NEW YORK 6, N. Y.

LETTERS to the EDITOR

Fungicide Data

In the April, 1957, issue of *Agricultural Chemicals*, we read with interest an article on the testing of various fungicides for the control of coffee rust in the Philippines. The article appeared on page 65 under the topic 1956 Fungicide Test—Part 3.

We would like very much to get in contact with the investigators who did this work and appreciate it if you would give us the name and address of the writer of the article. Or possibly you can give us the full names and addresses of Messrs. Orillo and Newhall.

A. G. Rogers
E. I. DUPONT DENEMOURS & Co.
Wilmington, Del.

F. T. Orillo, A. G. Newhall, Univ. of Calif.,
Agricultural Exp. Station, Berkeley 4, Calif.

Pyrenone Facts

Referring to a short summary in your magazine of March, 1957, of a "Pyrenone Facts Folder," issued by the Fairfield Chemical Division of Food Machinery and Chemical Corporation, New York.

We would like to obtain one from you or through you.

Lucy Masters, Librarian
FRUITGROWERS CHEMICAL CO.
Nelson, New Zealand.

NJVGA in Washington, D. C.



The accompanying picture illustrates a highlight of the recent trip to Washington made by members of the National Junior Vegetable Growers Association as guests of the National Cannery Association. This investigation of radioactivity and its effects on plants is one of many new agricultural projects the young "visiting firemen" saw during their tour of the USDA Experimental Station at Beltsville, Maryland.

Jean Way Schoonover
NATIONAL CANNERS ASSOC.
New York

(Continued on Page 10)

AGRICULTURAL CHEMICALS

Magcobar

PULGITE

is the workhorse of attapulgitic carriers



PULGITE, Magcobar's economical Attapulgitic carrier, is specifically processed to meet requirements of all but a few insecticide formulations... and to do it at a saving! For those few jobs which demand a lower VM carrier, Magcobar's premium-grade CARRICLAY steps into harness.

PULGITE and CARRICLAY are made from identical raw material out of the same mines, and are processed at carefully-controlled temperatures in the same modern plant facilities. PULGITE is dried to zero free moisture for maximum absorption at an economical price, while Magcobar's exclusive "slow burn" process super-dries CARRICLAY to a 6 to 8 percent VM content for even greater absorption.

For samples, prices, or consultation on your formulation problems... call or write the man from Magcobar.



MAGNET COVE BARIUM CORPORATION

P. O. BOX 4504 HOUSTON, TEXAS

MIN CHEMISTRY at work

case: How to cut costs with Attacloy as one carrier and diluent for all production

Attacloy

- ✓ Dust Bases
- ✓ Wettable Powders
- ✓ Finished Dusts

Carrier And Diluent Report: Pesticide processors—with product lines that range up to sixty and more mixtures—make substantial savings through across-the-board use of Attacloy as carrier and diluent.

This "one-material plan" cuts costs in many obvious (and some less obvious) areas:

- (1) Attacloy works well with all of the popular poisons . . . helps turn out premium products.
- (2) Its great sorptivity shortens cycle times . . . cuts "clean-out" down-time in mills, impregnators, mixers.
- (3) Permits greatly simplified inventory.
- (4) Scheduling and procurement problems eliminated.
- (5) In-plant carrier and diluent handling costs minimized.
- (6) Less chance of error in formulation.

Our business is to supply low-cost, nature-given products that make things go smoothly in your plant . . . well in your markets. Use the coupon.

MINERALS & CHEMICALS CORPORATION OF AMERICA
479 Essex Turnpike, Menlo Park, N.J.

I'm interested in a natural mineral product for _____

Send: ☐ Detailed "agchem" literature ☐ Free samples

name _____ title _____

company _____

address _____

city _____ zone _____ state _____

For more data, see
**Chemical Materials
Catalog**
Pages 330-334



MINERALS & CHEMICALS

CORPORATION OF AMERICA
479 Essex Turnpike, Menlo Park, N.J.

Leaders in creative use of non-metallic minerals

ATTAPULGITE (Attapulguas)
ACTIVATED BAUXITE (Porocel)
KAOLIN (Edgar & ASPs)
LIMESTONE (Chemstone)
SPEED-DRI FLOOR ABSORBENTS

Aqua Ammonia in Mexico

TO THE EDITOR:

On page 73 of the June issue of Agricultural Chemicals a news story about a contract awarded to Fabricated Metals, Inc., San Leandro, Calif., for the construction of four liquid fertilizer plants in Mexico, indicated that these plants will be the first plants in Mexico to manufacture aqua ammonia.

The story is not quite correct. One of our dealers on the west coast of Mexico has been manufacturing Brea Brand aqua ammonia for the past year. We originally made this arrangement as Brea Chemicals, Inc. Since our merger on July 1, however, we are now the chemical division of the Collier Carbon and Chemical Corp.

We would appreciate it if you would make reference to the fact that Brea Brand aqua ammonia has been manufactured on the west coast of Mexico for the past year.

Jack C. Heath
Collier Carbon & Chemical Corp.
Los Angeles

Prohibit Entry of Pests

TO THE EDITOR:

The enclosed copy of a letter to Senator Knowland of California was prompted by and the content closely tied in with the Gypsy moth situation, which has been so well presented in the June issue of Agricultural Chemicals.

I am sorry that I did not know about the Bill sooner. It may be too late to accomplish anything, even if it received favorable attention. However, unless some prohibitive action with respect to the deliberate entry of plant pest species of insects, nematodes and plant disease organisms is taken, we may have many more Gypsy moth situations ahead of us. Some may have already started but have not reached a detectable stage.

The letter expresses my personal convictions, based on long experience, and represents principles for which I have always fought—but without success except in California. The basic principle is a major part of that state's well known and effective program against the introduction of plant pests, through unintentional means. It will be extremely hard to protect against deliberate introductions.

H. M. Armitage,
Entomological Consultant
Sacramento, Calif.

The following are excerpts from the letter to Senator Knowland:

"If it has not already been acted on, HB-3476, designed to facilitate the regulation, control and eradication of plant pests, which has been passed by the House, and is now before the Senate, should not be passed unless amended to 'prohibit the entry or movement within the country of any insect, nematode, or plant disease organism, under any conditions, which is of known or suspected importance as a plant pest, which is not known to occur in this country.'"

"As written, the Bill allows the U. S. Department of Agriculture to issue permits approving entry or movement of such items. In its letter of explanation of March 13, 1957 to the Chairman of the

House Committee on Agriculture, Hon. H. D. Cooley, the Department, stated "Qualified research workers would be allowed to obtain and use material necessary for their investigations under conditions which would prevent dissemination of plant pests." Such a position is deemed hazardous, unnecessary, and unsupportable by any logical reason."

Mr. Armitage in the letter points out that species which must be imported or moved to permit study obviously do not occur in this country . . . that there is no 100% safeguard against escape of the pest, and there is serious danger of exposure to contamination in an uninfested area.

The species in question can always be studied where it occurs, and usually to better advantage. The increased cost of so doing would hardly be measurable in terms of the possible loss which could result from escape.

Pecan Scab Spray Results

TO THE EDITOR:

The pecan scab spray test results which I submitted for the 1956 Fungicide Tests appeared in error under apple scab and in Table 10 (March issue of *Agricultural Chemicals*, page 69). The results are quite misleading all the way around because of this error. The data should be interpreted for pecan scab control.

Richard H. Converse
OKLAHOMA AGRICULTURAL
AND MECHANICAL COLLEGE
Stillwater, Oklahoma

Editor's Note: The article published in *Agricultural Chemicals* followed the manuscript received by our office. The error apparently occurred in the preparation and handling of the very great volume of material for this report.

Clover Control Product

TO THE EDITOR:

We are advised by Niagara Chemical Company that they no longer manufacture their product entitled "Clover-Kil." With this in mind, we would appreciate your advising where we might expect to find a similar product.

R. F. Saunders
DAKOTA DRUG, INC.
28-32 Main St.
Minot, North Dakota

Editor's Note: If any of our readers can suggest a product for clover control, would they contact Mr. Saunders direct.

100,000 lbs./acre Tomatoes

TO THE EDITOR:

Every month I enjoy the column "Fertilizer Views and News."

Was especially impressed with the story in July about the 100,000 lbs. per acre tomato grower. Wow! How does he do it?

In reading your editorials, I don't recall any recent reference to liquid fertilizers for foliar or ground feeding. Do you have any late data on either of these . . . such as trends, types of analyses used, crops on which they are used, response of crop?

Earl F. Soop
THE JAY KEM COMPANY
Eustis, Florida



*In the
Spotlight
this Month*

Insect Identification . . . Some 90,000 specimens of "bugs," trash, etc. in all conditions and stages of disrepair are sent to the USDA annually with the question, "What is it?" Page 33.

Wheat Smut Control . . . Conclusion of a two-part article on the chemical control of wheat smut in the Pacific Northwest. Hexachlorobenzene was found to give effective control of this disease in tests described. Page 35.

Nematode Control . . . 1,2-dibromo-3-chloropropane is one of few materials which can be applied to certain plants in nematocidal quantities without injury. Reported to be 2 to 5 times as effective as ethylene dibromide. Another newly introduced nematocide is sodium n-methyl dithiocarbamate, reported also to exhibit fungicidal and herbicidal properties. These and other new developments discussed by Bert Lear of the University of California. Page 40.

Calcium Phosphate Nutrients . . . Conclusion of a two-part digest of results obtained in Scotland. Page 30.

Grain Protectants . . . Farmer's reluctance to employ preventive treatments, — a bottleneck in the grain program. On the other hand, protective sprays and powders are the only insecticidal measures now available to protect much of the great volume of grain in emergency storage on the farm. Page 28.

The Potash Institute . . . A review of its activities, — its program of education and contributions toward expanding the fertilizer market. Page 45.

Prilling Ammonium Nitrate . . . A description of the prilling processes employed by the Collier Carbon and Chemical Corp. at their Brea, Calif. plant. Page 38.

over $\frac{1}{4}$ million tons
have switched



Round-the-clock production at Bonnie takes the push out of peak-season demands. Mammoth off-season storage capacity swallows up the seven-day-a-week production, stores it safely until you need it. And the industry's finest delivery schedules assure you high-quality triple when you need it.

International's natural curing helps you cut costs

• It's the natural curing process that gives you that "something-extra" quality of the triple super from Bonnie.

It helps you cut costs . . . gives you better control of manufacturing conditions and chemical reactions . . . stabilizes your formulation problems . . . and reduces the delivered unit cost of (P₂O₅). Here's what natural curing means to you:

Uniform particle size . . . for dependable ammoniation results.

Finer texture . . . for more complete ammoniation in every batch.

Stabilized product . . . for better chemical control.

Constant high analysis . . . with guaranteed minimum of 46% A.P.A.

Uniform high quality . . . for increased (P₂O₅) availability.

To guarantee this top quality triple from a plant as large as Bonnie required extra planning in

plant design . . . extra capacity for a dependable supply . . . extra time to complete the five-week natural curing process . . . and extra care and quality control to assure uniform results in batch after batch.

This is the way Bonnie was built. And the results of the past year have proved Bonnie can deliver . . . Bonnie is dependable . . . and Bonnie can produce the kind of triple you want.

of Triple Super Sales to Bonnie

The reason: **trustworthy service and delivery plus superior results with International's natural-cured triple**

Here's why, in the actual words of Bonnie customers:*

Others have recommended you

"Several nitrogen producers have recommended your product to us because of its excellent ammoniation. They were right."

Missouri

You live up to delivery promises

"What we like about doing business with International is your service, particularly regarding delivery. Our material has always been shipped when requested."

Indiana

Your triple stores better

"Last September, we stored some of your triple next to competitive materials from two other suppliers. Six months later, the other two piles were set up hard enough to be blasted. Any lumps in your product could be broken with your fingers."

Minnesota

Your triple is a better product

"This is the best triple we have ever used for ammoniation."

Ontario

We get better ammoniation results

"We can put 600 lbs. of Urana 10 in with 1,400 lbs. of triple."

New York

Your Triple holds more nitrogen

"We have been amazed with the results. With a very high humidity we have been using 500 lbs. of nitrogen solution with 1,400 lbs. of your triple. Never before have we been able to get over 360 lbs. of this solution in the mix."

Maine

We save money with your triple

"We like the constant high analysis of your product. It aids us in formulation and reduces the unit delivered cost."

North Dakota

You meet delivery schedules

"We certainly appreciate the way International came through on schedule during the rush season."

Arkansas

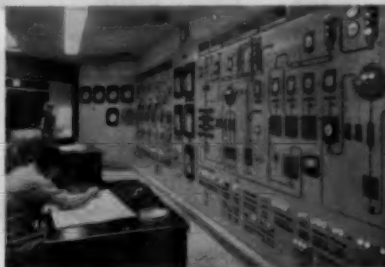
*names on request

These are just a few of the reasons why this year, the big switch in triple super sales is to Bonnie — giant production facilities . . . prompt delivery . . . superior quality . . . and outstanding ammoniation results.

So this year, for a better product, and service you can depend upon, look to International Minerals & Chemical Corporation. You'll be glad you did.



This 85,000-ton curing unit — as big as two, full-sized football fields — is one example of the time and big capacity needed to produce natural-cured triple.



These "doodads" and dials get results . . . guard the uniformity and quality of every batch of triple super from Bonnie . . . help assure you of top results in ammoniation.



INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Phosphate Chemicals Division • General Offices: 20 North Wacker Drive, Chicago 6

UNIFORM INSECTICIDES

Produced by Raymond clean, dustless, automatic, pulverizing units including Blended Field Strength Products also High and Low Concentrate Formulations

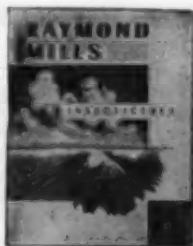


HELICOPTER METHOD OF LOW LEVEL DUSTING WITH "DDT" FOR CROP INSECT CONTROL

THE Raymond Roller Mill is standard equipment in many modern plants for general purpose grinding of organic concentrate formulations, as well as sulphur and sulphur-bearing insecticides and other field strength products.

Its success in these applications is due to the slow speed of the mill as well as its air-cooling and conveying system which permits insecticide formulations and diluent materials to be handled in one continuous operation.

Its special advantages include clean dustless operation . . . ease of fineness control . . . pneumatic feed device to keep mill at maximum capacity . . . economy in operation and maintenance.



Write for Raymond Bulletin No. 84



RAYMOND ROLLER MILL

An all-purpose, large capacity pulverizing unit for preparation of all types of insecticide dust formulations, including high concentrate mixtures.

← WHIZZER SEPARATION

Cut-away view shows double set of revolving whizzer blades. A simple exterior adjustment provides close fineness control over a wide range — insuring consistent uniformity of product and maximum capacities.

Raymond installations are flexible in arrangement and easy to fit into your existing plant layout. Refer your insecticide grinding problems to Raymond engineers.

COMBUSTION ENGINEERING, INC.
Raymond Division
 1314 NORTH BRANCH ST.
 CHICAGO 22, ILLINOIS

Combustion Engineering-Superheater Ltd., Montreal, Canada

SALES OFFICES IN
 PRINCIPAL CITIES

VAST CONSUMER MARKET
TRUE REPELLENCY
STABLE IN STORAGE
STABLE IN MOISTURE
STABLE IN LIGHT
SAFE TO HANDLE
REPELS STABLE FLIES
REPELS ROACHES, ANTS
REPELS RESISTANT INSECTS
ODORLESS
NO SKIN IRRITATION
NO RESISTANCE
NO INSECT CONTAMINATION
NO INHALATION HAZARD
NON-CORROSIVE
MISCIBLE IN SOLVENTS
LASTS LONGER
EFFECTIVE ALONE
EASY TO FORMULATE
COSTS LESS
COMPATIBLE WITH TOXICANTS
CAN BE USED AROUND FOOD
APPROVED FOR DAIRY CATTLE



GLENN Chemical Co., Inc. • 2735 No. Ashland Ave. • Chicago 14, Ill.

AUGUST, 1957

The truth about Tabutrex

23

**PROVEN
ADVANTAGES**
that can be the
most profitable
information in
your files!

TABUTREX has given "insect repellency" an entirely new meaning. Now, for the first time, it is possible to meet the vast consumer demand for a **SAFE, ECONOMIC, TRULY EFFECTIVE** fly, roach and ant repellent.

TABUTREX has been approved for use on dairy cattle.

TABUTREX builds a barrier against house flies, biting flies, roaches and ants.

TABUTREX repels even resistant flies and roaches...they just can't stand it (Humans and animals don't even notice it.)

TABUTREX is compatible with toxicants, but can also stand squarely alone. Soluble in oil...emulsi-fiable in water.

TABUTREX with its 23 proven advantages is certain to become one of your most important, most valuable, most profitable insect-control tools.

© 1957 - Glenn Chem. Co.

-----FILL IN COUPON-----
Glenn Chemical Co., Inc. Dept. AP
2735 N. Ashland Ave. Chicago 14, Illinois

Please rush me all important data on **TABUTREX** insect repellent.

Name

Address

City

Zone

State

Type of Business

(Please put specific inquiries on separate sheet)

NOW!

Raymond

**MULTIWALL BAGS
with**

GLUSIVE*

**HIGH GLOSS
printing**

**NON-SLIP
surface**



- **HIGH GLOSS PRINTING** adds brilliance and strength to colors...
- **NON-SLIP SURFACE** cuts breakage losses due to slipping. Bags stack safer

*Available at nominal cost

"The Little Man Who Never Slips"

RAYMOND BAG CORPORATION

Division of Albemarle Paper Mfg. Co.

MIDDLETOWN, OHIO

* RICHMOND, VIRGINIA

Safest, Most Effective Way To Control

FRUIT FLIES

THERE'S an *oil-free* Pyrenone* concentrate that provides safe, effective control of fruit flies in canneries . . . in food processing plants . . . on the farm . . . and wherever fruits and vegetables are in storage or in transit.

Pyrenone O.F. 75-7.5 is a combination of highly purified *pyrethrins* and *piperonyl butoxide*. It contains no petroleum distillate of any kind. When a suitable food emulsifier is added, it presents no toxicity hazards.

It's the proved safety factor that makes this concentrate so versatile. For instance, sprays based on O.F. 75-7.5 protect stored wheat against insect

damage during an entire storage season. A *single* application will do the trick—and the spray, when properly formulated, can be applied directly to the grain.

Pyrenone concentrates are available in both liquid and powder forms.

For complete information on Pyrenone O.F. 75-7.5—or other Fairfield pesticides, such as *piperonyl butoxide* (the *exclusive* synergist in Pyrenone) . . . *piperonyl cyclonene* . . . *pyrethrum* . . . *allethrin* . . . and *rotenone*—contact the nearest office of Fairfield Chemical Division, Food Machinery and Chemical Corporation. Branches in principal cities.

* Reg. U. S. Pat. Off., FMC.

Pyrenone



Sales Headquarters: 441 Lexington Avenue, New York 17, N. Y.

In Canada: Natural Products Corporation, Toronto and Montreal

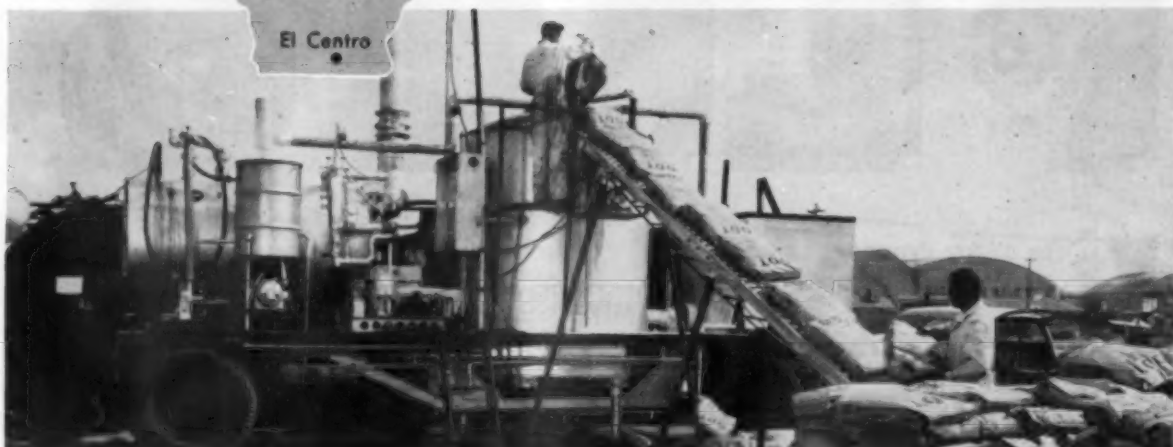


OTHER FMC CHEMICAL DIVISIONS: WESTVACO CHLOR-ALKALI Alkalies, Chlorinated Chemicals, Carbon Disulfide
WESTVACO MINERAL PRODUCTS Phosphates, Barium and Magnesium Chemicals • BECCO CHEMICAL Peroxyphen Chemicals
NIAGARA CHEMICAL Insecticides, Fungicides and Industrial Sulphur • OHIO-APEX Plasticizers and Resins • FMC ORGANIC CHEMICALS

United-Heckathorn chemical manufacturing and application facilities in key agricultural areas provide first complete local service

United-Heckathorn permanent or portable plants manufacture insecticides, fertilizers, weed killers, fungicides and fumigants on location and offer aerial or ground application service. The portable plants may be transported to your job site. Both types are scale versions of United-Heckathorn main Richmond, Calif., plant with its research, development and control laboratories . . . vast facilities for mixing, grinding, blending of dry materials and liquids for bulk sales, custom processing, private label packaging . . . engineering for construction and maintenance of specialized processing and application equipment. United-Heckathorn, Richmond or any of the affiliated plants are at your service and invite your call.

UNITED Heckathorn



Portable plant compounding chemicals for aerial spraying of beet leaf hopper on 250,000 acres of Kettleman Hills, Calif.



Main Laboratory, Richmond. Chemists, machinists and other technical supervisory personnel accompany field jobs.



Extensive ground application work and chemical sales at Soledad, Calif. in the center of the "Salad Bowl" Salinas Valley.



Packaging and delivery for sales of agricultural chemicals for citrus crops, Corona, Calif.



Formulation and application, aerial and ground, in Imperial Valley, the world's largest vegetable growing center.



Formulation of dry & liquid insecticides for San Joaquin Valley, Lemoore plant near Fresno, center of cotton, potato & grape areas.

UNITED-HECKATHORN

Main office and plant: 600 S. Fourth Street, Richmond 4, Calif.

Phone: LANDscape 5-9210

Plants at Soledad, Corona, El Centro, Lemoore

Millions of Tons...

TRIPLE SUPERPHOSPHATE



*Fine Texture, Small Particle Size
For Maximum Ammoniation-Granulation*

Millions of tons of high grade Triple Superphosphate have been produced in our large Tampa plants to supply many of the large and small fertilizer producers of this country, and, of course, many in foreign lands, with a Triple Superphosphate of highest dependability. We established, many years ago, high standards of product control through exacting chemical and physical analysis of every ton we produce. We have maintained these standards and have improved upon them as progress in chemical and mechanical science dictated. We are today producing Triple Superphosphate as fine as there is available. A product of very fine texture, small particle size that returns highest rate of ammoniation. A product that has received weeks of natural air curing to further enhance its chemical composition, and each batch has been pre-shipping conditioned to permit immediate inclusion into your processing.

RIGID QUALITY CONTROL
Through Six Basic Chemical and Physical Analysis

HIGH WATER SOLUBILITY
High Water Solubility is a Characteristic of all 3 Grades

RUN-OF-PILE
Fine Texture, Highest Porosity, Large Surface Area, Small Particle Size, for Maximum Ammoniation-Granulation.

GRANULAR
Dust Free, Free Flowing, Uniform Particle Size, Medium Hardness, No Bridging Over, for Direct Soil Application.

COARSE
For Intermediate Ammoniation to Produce a Semi-Granular Product. Also Affords Excellent Compatible Mixing with Granular Potash, for Minimum Segregation, in Alkaline Grades.

There's a BRADLEY & BAKER office near you. Their representative would be pleased to consult with you on your requirements and to advise on your most convenient delivery routings.

**U.S. PHOSPHORIC
PRODUCTS**
TAMPA, FLORIDA

Division
TENNESSEE  CORPORATION

SALES AGENT:
BRADLEY & BAKER
155 East 44th Street—New York 17, New York
DISTRICT SALES OFFICES:
Atlanta, Ga. Indianapolis, Ind. St. Louis, Mo.
Norfolk, Va. Houston, Tex.

from this simple flower comes

PYRETHRUM

The wonder insecticide that is the most toxic to insects and the least toxic to humans and warm-blooded animals of ALL currently known insecticides.

Prentox Pyrethrum & Pyronyl Concentrates are available for:
Aerosols • Fly & Roach Sprays • Mill & Industrial Sprays
Agricultural & Cattle Sprays • Truck Crop & Garden Insecticides
Grain Protectants

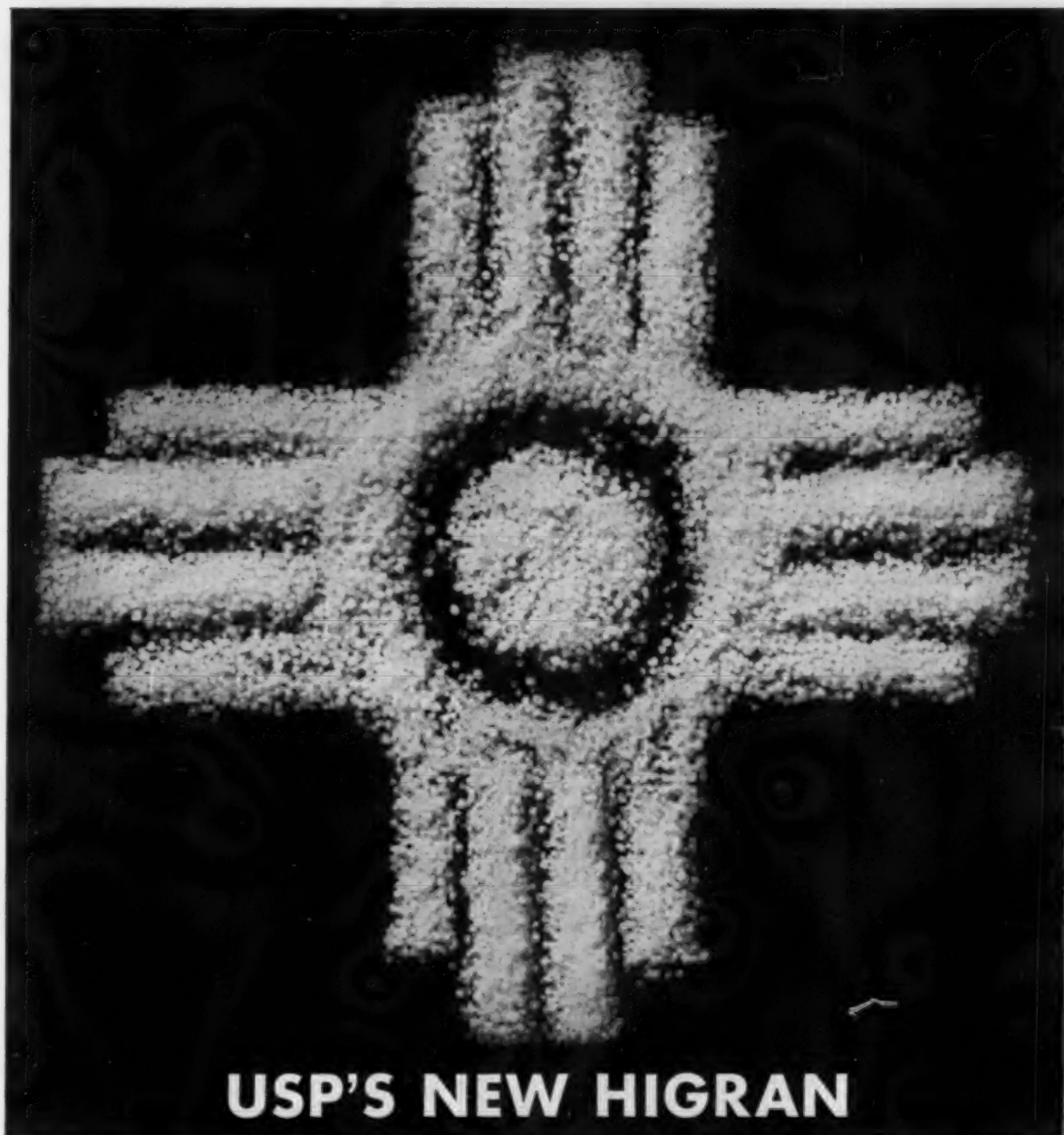


Try these Prentox Pyronyl and Pyrethrum Pest-Tested Products

Pyrethrum Extract #20 • Pyrethrum Extract #100 • Pyrethrum Extract 20%
Pyronyl #20 • Pyronyl #100 • Universal Concentrate • Pyronyl #101
50-5 Oil and Emulsifiable Concentrate • 40-5 Concentrate • 20-8 Concentrate
66-6 Oil and Emulsifiable Concentrate • Pyronyl 75 - The Oil-Free Concentrate
Roach Spray Concentrate • Pyrethrum Powder • Dust Concentrate

PRENTISS DRUG & CHEMICAL CO., INC.

101 West 31st Street, New York 1, N. Y.
9 South Clinton Street, Chicago 6, Ill.



USP'S NEW HIGRAN

SPECIALLY SIZED PARTICLES FOR MODERN FERTILIZERS

USP announces the FIRST Higrade Granular muriate of potash designed specifically for the manufacture of today's modern fertilizers. Its perfect whiteness attests to its purity—the highest now available in granular agricultural muriate of potash. Non-caking and free-flowing throughout, USP's new Higrade Granular potash contains 62/63% K_2O . A regular supply of this important new potash product is immediately available from the U.S. Potash Co.

USP also offers Higrade muriate of potash—62/63% K_2O and Granular muriate of potash—60% K_2O —both free-flowing and non-caking.

UNITED STATES POTASH COMPANY

DIVISION OF UNITED STATES BORAX & CHEMICAL CORPORATION

50 Rockefeller Plaza, New York 20, New York

Southern Sales Office: Rhodes-Haverty Building, Atlanta, Georgia



REG. U.S. PAT. OFF.

INDUSTRY MEETING CALENDAR

Aug. 13-14 — Ohio Pesticide Institute, Ohio Agricultural Experiment Station, Wooster, O.

Aug. 14—Connecticut Agricultural Experiment Station Field Day, Mt. Carmel, Conn.

Aug. 26-28—American Phytopathological Society Meeting to be held in conjunction with The American Institute of Biological Sciences, Stanford University, Palo Alto, Calif.

Aug. 23-31—Soil Conservation So-

ciety of America. Annual Convention, Asilomar, Cal.

Sept. 4-6—Annual meeting, National Agricultural Chemicals Association, Hotels Essex & Sussex, and Monmouth, Spring Lake, N. J.

Sept. 5-6—Great Lakes States Anhydrous Ammonia Meeting, Michigan State University, East Lansing, Mich.

Sept. 8-15—International Congress of Crop Protection, fourth inter-

national meeting, Hamburg, Germany.

Sept. 11-13—Florida Entomological Society, San Juan Hotel, Orlando Fla.

Sept. 15-18—Canadian Agricultural Chemicals Assn. Mont Tremblant Lodge, Province of Quebec, Canada.

Sept. 24-25—New England Fertilizer Conference, Bald Peak Colony Club, Melvin Village, N. H.

Oct. 2-4—Beltwide Cotton Mechanization Conference, Shreveport, La.

Oct. 3-5 — Pacific Northwest Plant Food Assn., Sun Valley, Idaho.

Oct. 7-8 — Western Agricultural Chemicals Assn., Villa Hotel, San Mateo, Calif.

Oct. 17-18—Assn. of American Fertilizer Control Officials, Shoreham Hotel, Washington, D. C.

Oct. 28-31 — Entomological Society of Canada, and Entomological Society of Alberta, Lethbridge, Alta., Canada.

Nov. 3-5—California Fertilizer Association, St. Francis Hotel, San Francisco, Calif.

Nov. 6-8—Fertilizer Industry Round Table, Sheraton Park Hotel, at Washington, D. C.

Nov. 17-19—National Fertilizer Solutions Assn., Netherland - Hilton Hotel, Cincinnati, Ohio.

Dec. 2-5—Entomological Society of America, National meeting jointly with cotton states ESA, Hotel Peabody, Memphis, Tenn.

Dec. 9-12 — Chemical Specialties Manufacturers Association, Hollywood Beach Hotel, Hollywood, Fla.

Dec. 9-12—Vegetable Growers Association of America, Jung Hotel, New Orleans.

Dec. 10-12 — North Central Weed Control Conference, Hotel Savory, Des Moines, Iowa.

Dec. 11-13—Agricultural Ammonia Institute, Hotel Marion, Little Rock, Ark.

Dec. 12-13—Cotton Insect Control Conference, Peabody Hotel, Memphis, Tenn.

Jan. 4-5—1958 Texas Fertilizer Conference, Texas A&M, College Station, Texas.

Jan. 13-15—1958 Weed Society of America and Southern Weed Conference, Peabody Hotel, Memphis, Tenn.

Jan. 21-23 — 1958 California Weed Conference, San Jose, Calif.

March 4-5 — 1958 Western Cotton Production Conference, Hotel Cortez, El Paso, Texas.

superior grinding equipment since 1891

BRADLEY PNEUMATIC HERCULES MILL

Provides a uniform grind from 20 to 325 mesh. Floor level installation provides easy accessibility . . . lowest installation and maintenance costs. Durable, non-clogging vibratory feeder for dependable, worry-free operation . . . even on material with some amount of moisture.

*for Fine
grinding of
limestone
phosphate
rocks, etc.*



*for Semi-fine
grinding of
agricultural
limestone*

BRADLEY HERCULES MILL

From rough to finish in one low-cost operation. Automatic electric feed control eliminates manual operation. Rugged, dustless construction, maximum accessibility, keep maintenance costs at an absolute minimum. In sizes to meet any requirements at moderate cost.

For complete information, write for catalogs No. 61-62



Bradley PULVERIZER CO.

LONDON ALLENTOWN, PENNA. BOSTON

AGRICULTURAL CHEMICALS

THE MAN WITH THE



MULTIWALL PLAN

**UNION
PACKAGING SPECIALIST
BLAINE LOUDIN**

**lowers a
Multiwall
user's
overhead
\$37,584**



66 minus 27 = 37,584. Loose logic? Not for a large agricultural chemicals' firm whose Multiwall Packaging and materials handling system was recently reviewed and revised by Union Packaging Specialist Blaine Loudin.

The 27 represents a reduction in the company's labor force from an original staff of 66. The 37,584... seasonal dollar savings achieved following adoption of Union's recommendations for more efficient, economical operation.

Among the new proposals: using a lateral bag conveyor for carloading. This improvement alone speeded handling and freed three men for other plant work.

The complete changeover was made using existing equipment and buildings with only slight modifications. Capital outlay expended by the company was paid

back in less than 13 months.

This is a typical case of Union's 5-Star Packaging Efficiency Plan in action. Write for full information.

Union Multiwall Recommendations
are based on this 5-star
Packaging Efficiency Plan



- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

Better Multiwall performance
through better
planning



UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

UNION MULTIWALL BAGS

UNION BAG - CAMP PAPER CORPORATION
233 BROADWAY, NEW YORK 7, N. Y.

NOW-Assured Supply

...from

Antara



NOW IN FULL PRODUCTION—Antara Chemicals' new surfactants plant at Calvert City, Ky.



Linden, N. J. and Rensselaer, N. Y., plants and warehouses, where surfactants are produced and stored.



Tank farm at Alameda, Calif., supplied in bulk by ship from Linden, N. J.



Additional warehouses, where supplies of all surfactants are kept for speedy delivery.

Charlotte, N. C.*

Houston, Tex.

Chattanooga, Tenn.

Providence, R. I.

Chicago, Ill.

Portland, Ore.

Los Angeles, Calif.

San Francisco, Calif.

Antara's new surfactant chemicals plant at Calvert City, Ky. is now in full production of Alkylphenols, Igepal® and Alipal®. This represents another step in GAF's program to assure continuity of supply by means of multi-plant production facilities and nation-wide distribution points.

Antara is now in an even better position to assure you of speedy delivery in bulk or drums regardless of your plant's location.

From Research to Reality



ANTARA. CHEMICALS

A SALES DIVISION OF

GENERAL ANILINE & FILM CORPORATION

435 HUDSON STREET • NEW YORK 14, NEW YORK

SALES OFFICES: New York • Boston • Providence • Philadelphia • Charlotte • Chattanooga • Chicago
Portland, Ore. • San Francisco • Los Angeles. IN CANADA: Chemical Developments of Canada, Ltd., Montreal



Real speed and accuracy...

That's the BEMIS FERTILIZER PACKER

How would you like *this kind of* money-saving speed and accuracy? In actual plant operation, the Bemis FERTILIZER PACKER is filling and closing sixteen to eighteen 80-lb. bags per minute ... and holding consistently to a weight tolerance of plus or minus 4 oz.

And now...

Bemis JETROL injector...



The new, better way to add liquid insecticides to fertilizer.

JETROL, a Bemis-designed attachment for the new Bemis FERTILIZER PACKER, automatically sprays liquid insecticide *through* your fertilizer as it falls into the bag. JETROL measures exactly, diffuses thoroughly and minimizes toxic problems. You'll like its dependable performance.

Here are the pay-off features:

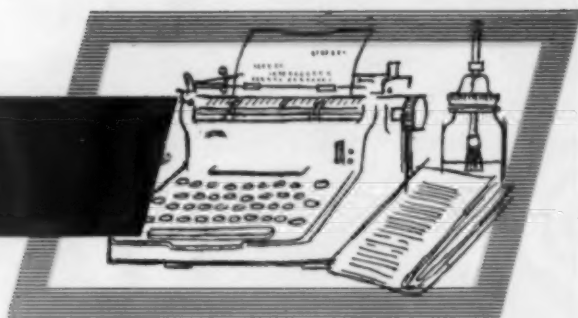
- Improved feeder design to insure maximum accuracy at higher speeds.
- Bemis-designed automatic sewing machine actuator and cutoff.
- Vee-Trof or Vee-Slat Conveyor optional... keeps bag upright unassisted.
- Stainless steel product-contact surfaces and functional parts with corrosion-resistant paint used throughout.
- One- or two-man operation.
- Size range: 50-, 80-, 100-lb. multiwall bags; 100-, 200-lb. textile bags.

Bemis



General Offices—St. Louis 2, Missouri
Sales Offices in Principal Cities

EDITORIALS



TAKING stock of crop conditions, reports of insect infestations and pesticide and fertilizer sales from all around the country as we move into the second half of the 1957 growing season, it readily becomes apparent that no sales and profit records are going to be broken this year, unless it might be on the down side. Reports from the trade on the sales picture range from "spotty" to "downright discouraging," and only a better balance in the precipitation picture from here on out can save the crop outlook for this season.

The principal unfavorable factor has again been rain,—the absence of adequate moisture from some areas, bringing a recurrence of drought conditions, while in other areas there has been so much rain that floods have followed. In many areas crops have had to be replanted two or three times, with the result that the season is far behind normal. With August just a few weeks off, as these words are written, the farmer and his supplier of agricultural chemicals are definitely at the mercy of the weather from here on out.

The sickest picture is of course in the cotton south, particularly in Texas. Cotton farmers were optimistic early in the season, for in many areas they had their first real rains in ages, giving a crop to drought stricken acres which hadn't grown anything for seven years. Unfortunately the rain refused to stop, and floods followed, while in other areas the early rains were followed by a long hot spell which brought a return of drought conditions.

Fertilizer sales in cotton and tobacco areas have suffered, partly as a result of the floods and

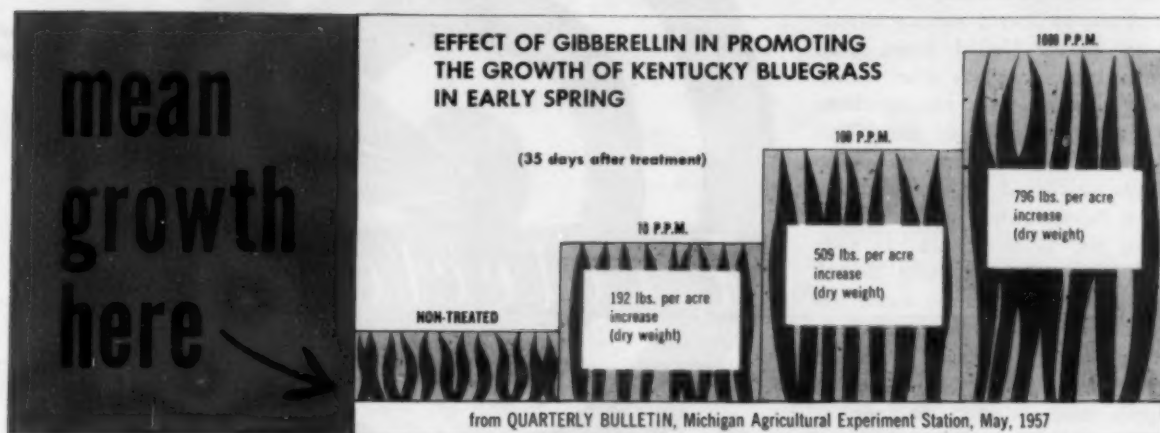
droughts, and partly as a result of land being retired from cultivation under the soil bank program. Nor have pesticides been moving in substantial volume,—and when the cotton poison business is sick the whole pesticide industry feels it, for this of course is the No. 1 big volume item.

Floods have also hit the big corn growing states west of the Mississippi. In some areas replanting was just beginning again early in July, in areas where traditionally the corn should have been a foot high by that date. By contrast, Indiana, Illinois and Ohio have experienced a serious shortage of the normal rain pattern. Around New York, New Jersey and New England, sales of pesticides were reported good up to and through the second quarter. Then suddenly, after six to eight weeks of dry weather, sales activity simply stopped. The area is beginning to experience something approaching the drought conditions that have racked other parts of the country in recent years.

Fortunately the outlook is not one of complete gloom. One pesticide raw material supplier around the New York area reported that he had done the best second quarter's business in his concern's history up to July 1. Another reported an excellent volume of business on pesticide materials, although this was primarily in products for the household and particularly the aerosol field, while sales in the agricultural field were down. Another concern operating on a national scale reported a very good picture, particularly on the west coast. They indicated a substantial volume of business in pesticides for fly control, pest control on fruit, and cattle fly control.

(Continued on Page 99)

VELSICOL GIBBERELLINS



A new product with a big profit potential!

COMMERCIAL QUANTITIES AVAILABLE NOW! Velsicol, leader in chemistry for agriculture and home gardening, can now supply commercial quantities of Gibberellins, the amazing new plant growth stimulant. The effectiveness of Gibberellins in increasing plant growth, speeding germination, and promoting earlier flowering and release from dormancy, has been demonstrated on many plants at application rates as low as a few parts per million.

VOLUME SALES PREDICTED Quite literally, Velsicol Gibberellins can expand your business into a "growing" market with a very high sales potential. Preliminary tests indicate that Gibberellins will have wide application in food, feed, and fiber agriculture, and will also be widely used for ornamentals, house plants, trees and shrubs.

VELSICOL TECHNICAL SERVICE Tests are in progress on major crops at experiment stations throughout the country. Write for formulation data and bulletin summarizing previous test information, or consult your Velsicol technical representative.

CONTACT VELSICOL NOW FOR FULL DETAILS!



VELSICOL CHEMICAL CORPORATION

330 East Grand Avenue, Chicago 11, Illinois

Manufacturers of Chlordane, Heptachlor, Endrin, and Methyl Parathion Insecticides.

GRAIN protectants consist of formulations of chemicals having toxic or repellent action, or both, for grain-damaging insects. Generally, they are applied to prevent infestation, but they may be applied also to destroy existing infestations. In the United States, grain protectants as well as other insecticides must meet the toxicity claims stated on the label, and must fulfill the safety and adulteration requirements established by the Food and Drug Administration under the Food, Drug and Cosmetic Act. In addition, they must not cause degrading of grain by imparting undesirable feel, odor or other characteristics to the grain. For consumer acceptance, grain protectants must be easy to apply, must not affect the grain adversely for use as seed or feed, and must be competitive with costs of other insect control measures. Grain protectants now fulfilling these requirements and having both toxic and repellent action consist of formulations of pyrethrins synergized by piperonyl butoxide for application as sprays or powders. An estimated 30 to 40 million bushels of grain, largely wheat in commercial storage, were treated with these grain protectants during 1955.

Recent activities by inspectors of the Food and Drug Administration and demands by wheat buyers representing flour mills have stimulated interest in clean wheat at the farm level. According to the monthly *Kansas Crop Report*, there was an average of 100 million bushels of wheat and oats in storage on Kansas farms in October 1953, 1954 and 1955. In addition, corn, sorghums, and other small grains hiked this total to 150 million bushels, all of which was subject to damage by grain-infesting insects.

Much of the wheat stored on the farms was emergency storage, rather than part of a regular, planned, grain storage program. The emergencies included storage of elevator or box-car space at harvest time, shortage of trucks or drivers, and income tax adjustment. The significant point is that many farmers stored wheat on their farms because they had to, and



they hoped that hereafter it would go directly from the combine to the commercial elevator. This situation discourages construction of adequate storage facilities, and the practice of desirable measures for grain sanitation. Inevitably, it results in infestations and damage by insects unless preventive measures are taken. With a planned grain storage program, preventive measures include good housekeeping and other management practices as primary steps, and depend on insecticides only as a last resort. Where on-the-farm storage is an emergency program, insecticidal treatment with protectants or fumigants likely will be the only measures used for insect control.

Emergency grain storage facilities on Kansas farms frequently have been decidedly unsatisfactory with respect to sanitation. Bins have been found in all stages of disrepair, litter of spilled grain and feedstuffs has been scattered about the farmstead, market grains have been stored adjacent to infested feed grains, and animal shelters have been used as granaries.

The effective use of fumigants requires tight well-constructed bins and a standard of sanitation high enough so that reinfestation will not follow treatment immediately. Competent observers have estimated that less than 20 per cent of the fumigations of grain in farm storage in the Kansas area result in satisfactory insect control because of leaky bins, inadequate dosages, and improper application, or because of lack of knowledge, or fear of fumigants.

Tests conducted on Kansas farms during the past six years have demonstrated that the protective sprays and powders that contain pyrethrins synergized by piperonyl butoxide are admirably adapted for use under farm conditions.

They will prevent insect damage for at least one season of storage under most circumstances. Approximately 730 bins of grain, largely wheat, on 222 farms were treated with seven formulations of protective powders and four formulations of protective sprays. To insure rigorous tests, wooden storage bins and sites rating from fair to poor in sanita-



FOR FARM GRAIN STORAGE

by DONALD E. WILBUR

Kansas State College
Manhattan, Kansas

tion were selected for treatment. All applications were made by farmer cooperators with scarcely more than the instructions given on the labels of protectant container. The powders were packed in convenient sized sacks to assist in accurate applications, also small hand trombone-type sprayers were supplied for applying the sprays.

The most successful formulation of protective powders contained 1.1 per cent piperonyl butoxide and 0.08 per cent pyrethrins impregnated in pulverized grain dust. It was applied at the rate of 75 pounds per 1000 bushels, which deposited 13.7 ppm of butoxide and 0.99 ppm of pyrethrins.

The protective sprays were of two types: one was emulsifiable in water; the other prepared for application with the pyrethrins and butoxide dissolved in tetrachloroethylene as a fumigant carrier. The water emulsifiable formulations were applied in 4 or 5 gallons of water per 1000 bushels of wheat, which left a residue of approximately 1.42 ppm of pyrethrins. The formulation with the fumigant carrier was applied at 2 gallons per 1000 bushels, which left a residue of 1.12 ppms of pyrethrins.

The protectants were applied to uninfested wheat at some point between the combine and the bin, usually as the wheat poured out of the combine hopper into the truck bed, or as it was dumped from the truck into the lifter hopper. Without exception, farmer cooperators did not consider the application meth-

ods bothersome or impractical, though a few objected to the dust resulting from application of the powders.

A prominent factor in practical tests with insecticides applied to grain in farm storage is the variability between the different granaries and within the same granary. The more significant of these variables include: availability of grain-infesting insects; size, shape, construction and location of the bins; type and amount of grain; thoroughness in application of the insecticides; dosage rate; moisture content and temperature of the grain; and the type of storage management practiced by the farmer. Because of the importance of these factors, it was thought inadvisable to compare one granary with another in determining results. Each granary had to be considered on its own merits without reference to other granaries. Also, in some instances, there were no untreated check bins on the premises since, during the latter part of the storage period, the presence of infested untreated check grain influenced the rapidity of infestation of treated bins.

The procedures for evaluating results consisted of periodic sampling of all bins from harvest until November, to determine the kinds and numbers of insects and the moisture content of the wheat. After November, results of the treatments were rated in terms of good, fair or poor control, after taking into account the opportunities for infestation and assessing the probable damage without treatment. Bins with no infestation or with light infestations in November were considered to have been protected from insects through June, since the low winter temperatures would prevent insect migration.

The more significant results and conclusions drawn from these studies are as follows:

1. In general, protective sprays and powders containing pyrethrins synergized by piperonyl butoxide applied at recommended rates in an approved manner prevent damage to wheat and barley during the first season in farm storage.

2. The best results occur when the protectants are applied as part of a grain sanitation program which includes granary clean-up, application of residual bin sprays, and isolation of market grains from feed grains.

3. In some instances, standard dosages are not adequate when treated wheat of high moisture is stored in particularly unsanitary granaries.

4. Even at low dosages, grain-damaging insects are more abundant in untreated than in treated wheat in the same granary.

Occasional unsatisfactory results in the Kansas area were found to be associated with inadequate dosage, incorrect application, and especially unsanitary conditions which provided a continuous source of infestation. A few insect species, particularly *Plodia* moths, were not controlled by the treatment. In general, the results were progressively more favorable from south to north in Kansas at the same application rates. This may be the result of more continuous opportunities for infestation, higher moisture conditions, and poorer storage sanitation found in Southeastern Kansas. Results with protectant treatments in Southeastern Kansas may improve with increased dosages, follow-up treatments, and improvement of sanitation measures.

(Continued on Page 99)

Calcium Phosphates

... as plant nutrients

Conclusion of a two-part article

Dicalcium Phosphate Dihydrate: In the low solid:water ratio extraction, this compound gave a concentration of about 0.06 gram P_2O_5 per liter in each of the first three extractions; 88% of the total P_2O_5 had been dissolved. Subsequent extractions gave much lower concentrations, and after 13 extractions it was not possible to dissolve any more phosphate. Perhaps after the third extraction, the sharp drop in P_2O_5 concentration coincided with the disappearance of the monocalcium phosphate dihydrate phase, the remaining solid P_2O_5 equivalent to about 12% of the total originally present being a more basic compound resulting from the decomposition of $CaHPO_4$.

Extractions of the larger weight of $CaHPO_4 \cdot 2H_2O$ showed amounts of P_2O_5 about 0.06 gram P_2O_5 per liter of water, but successive extracts showed a larger variation in P_2O_5 concentration than expected. This may be the result of differences in the amount of decomposition which occurred in the successive extractions. Sanfourche and Henry (loc. cit.) carried out a similar test with a comparable solid to water ratio, but used a 24-hour period of extraction instead of the 30 minutes period used by Raistrick. They found that the phosphate present in the solution as $CaHPO_4$ remained fairly constant at about 0.03 gram per liter, while the phosphate present in solution as the monocalcium salt at the same time, varied considerably, reaching a maximum of about 0.1 gram P_2O_5 per liter in the seventh extraction. The higher total P_2O_5 concentration reported by the French investigators, and the fact that they used a longer period of extraction, could indicate that dicalcium phos-

phate in the presence of water decomposes at a slow rate. After 13 extractions, these same French workers found that monocalcium phosphate no longer appeared in the solution, and after 55 extractions, dicalcium phosphate disappeared; the concentration then being 0.006 gram "tricalcium phosphate" per liter (equivalent to 0.0027 gram P_2O_5 per liter). Dr. Raistrick found with hydroxyapatite, that his extractions dissolved 0.002—0.003g. P_2O_5 per l.

Examining the results of Sanfourche and Henry (loc. cit.), Dr. Raistrick estimates that about 30% of the original P_2O_5 present as $CaHPO_4$ remained undissolved when the P_2O_5 concentrations fell to 0.003 gram p. liter, which indicates that the remaining solid phase must have been hydroxyapatite.

The relative proportions of water and fertilizer in a soil will vary over a wide range. An approximate estimate can be made from the available water content of a soil—meaning water content at field capacity, minus water content at wilting point. From data given by E. J. Russell⁴ this varies between 0.3 and 3.0 inches of water per foot of soil, depending upon soil type. If 1.5 inches is taken as an average figure, and applying a dressing of dicalcium phosphate dihydrate ($CaHPO_4 \cdot 2H_2O$) to furnish 60 pounds of P_2O_5 per acre distributed throughout a 6-inch depth of soil, we shall get a value for the $CaHPO_4 \cdot 2H_2O$:water ratio of 0.9 gram per liter. This is comparable with Dr. Raistrick's lower solid:water extraction figure, discussed previously.

From these considerations Dr. Raistrick believed he could conclude 3.0 inches of water per foot of soil,

⁴E. J. Russell. *Soil Conditions and Plant Growth*. 5th ed. London, 1950.

that the net fertilizing value of dicalcium phosphate dihydrate is equivalent to about 30% of the total P_2O_5 as hydroxyapatite and about 70% as a "stable" soluble phosphate. **Dicalcium Phosphate, Anhydrous.** ($CaHPO_4$): Dr. Raistrick found that this salt dissolved less than did the dihydrate. Bassett⁵ reported that $CaHPO_4 \cdot 2H_2O$ and $CaHPO_4$ differed only slightly in water solubility. Since the anhydrous salt reacts with or is dissolved by water so very slowly, it is commonly rated as being less soluble. Below 36°C, Bassett found that the dihydrate is the stable form and because of its slow rate of reaction the speed at which $CaHPO_4$ is converted to $CaHPO_4 \cdot 2H_2O$ is so very slow as to be hardly perceptible.

Dr. Raistrick obtained a sample of pure crystallized $CaHPO_4$ from T. V. A. and compared its solubility with the same compound he had prepared. The T. V. A. salt dissolved much more slowly, a 30-minute extraction giving only 0.007 gram per liter. After 10 days at room temperature and an occasional shaking, the concentration rose to 0.013 gram per liter. This compared with 0.015 gram per liter obtained in the first extraction of his own preparation. Both systems had a solid to water ratio of 0.5 gram $CaHPO_4$ per liter.

The P_2O_5 concentrations in the high solid to water extractions were about twice those found with the lower ratio. After many extractions had given very little concentration of P_2O_5 , Dr. Raistrick concluded that no evidence exists to show that relative to the amount of P_2O_5 dissolved, the decomposition of the anhydrous is any greater than that of the dihydrate. Perhaps the difference in apparent solubility of the two ma-

⁵H. Bassett, Jr. *Z. anorg. Chem.* 1908, 59, 1.

terials may result in different degrees of availability to a crop, but in the laboratory at least, it is not possible to differentiate between them insofar as concerns total availability.

Hydroxyapatite: This compound was extracted with water as in the case of the other phosphates discussed above. The concentration of the P_2O_5 tended to decrease in the later extractions, but the P_2O_5 concentrations were in the range of 0.002–0.003 gram P_2O_5 per liter.

Scale of Fertilizer Values

ON the basis of the previously described laboratory tests, together with published data relating to tests with plants, Dr. Raistrick suggests the following scale of relative values for a mixture of calcium phosphates commonly used in fertilizers in which monoammonium phosphate is used as the standard, because in decomposing it water does not produce a less soluble phosphate and also the fact it is a commonly used fertilizer material.

Reference is made to work published by Ross and Associates* as follows in which they assumed that "... the P_2O_5 in the reverted phosphate and in the undecomposed rock, or ammoniated goods are respectively 50 and 15% available to all crops on acid soils, ...". Dr. Raistrick believes these values are low, and refers to several other investigators in support of his belief. On acid soils he regards precipitated hydroxyapatite as furnishing 60% and rock phosphate 20% of potentially available P_2O_5 . (In this connection it is necessary to specify the origin of the rock, since Moroccan and Gafsa rocks behave more favorably than Florida pebble rock. V. S.). In Table 3

* Ross, Adams, Hardesty, Whittaker, J. Assoc. Off. Agr. Chem. 1947, 30, 624.

Table 4.
Scale of Fertilizer Values from Plant Growth Tests.

Source of P_2O_5	Acid Soil		Calcareous Soil	
	Fertilizer value av., 2 crops	Estimated fertilizer value	Fertilizer value av., 2 crops	Soil Estimated fertilizer value
Dical. phosphate	69	88	92	76
Dical. phos., $2H_2O$	84	88	99	76
Hydroxyapatite	57	60	6	20
Residue from ammon. fertilizer	47	63	64	26
Nitrophosphate	111	80	47	59

are estimates of the relative scale of values for assessing mono—and dicalcium phosphates on the basis of their decomposition, and a scale of values for acid and calcareous soils. We see from this table that marked differences appear in the case of calcareous soils. The position of hydroxyapatite was located on the basis of Aslyng's data⁷. Aslyng found on a phosphate deficient soil that crop response was related to the total P_2O_5 concentration of a solution as determined by extracting the soil with 0.01M calcium chloride solution: a P_2O_5 concentration of about $2 \times 10^{-4}M$ in the extract was adequate for plant growth.

In a calcareous soil with pH 7, with hydroxyapatite present, the phosphate concentration can be calculated from the solubility product as about $2 \times 10^{-8}M$ using the 0.01M calcium chloride extractant. This figure of $2 \times 10^{-8}M$ is only 1/100th of the concentration needed for optimal plant growth. Hence, hydroxyapatite can be considered useless as a supplier of nutrient phosphorus in calcareous soils. It might have some long-range value as a soil builder and is given the value 20 in Table 3. Rock phosphate has even less value on such soils, because it is less likely to be decomposed by water, and the

value 10 given it in Table 3 is fair and generous.

In this same calcareous soil pH 7 dicalcium phosphate, extracted with the same 0.01M calcium chloride will have a probable P_2O_5 concentration of about $2 \times 10^{-4}M$, which is about 100 times greater than the level Aslyng assumed adequate for growth. Dicalcium phosphate therefore would be, on this basis, equally as effective on calcareous as on acid soils, except for that fraction of it which is converted to hydroxyapatite. Hence, in Table 3 Dr. Raistrick assigns a value of 76 for dicalcium phosphate on calcareous and 88 for acid soils. This value, 76, is a maximum figure, and might be an overestimate because the rate at which $CaHPO_4$ is decomposed can be retarded if the level of calcium in the soil solution is high, resulting in a greater amount of the hydroxyapatite produced. For these same considerations, the assessed value of monocalcium phosphate in calcareous soils is dropped from 97 (acid soils) to 93.

Dr. Raistrick points out that if hydroxyapatite were present in an acid soil of pH 5.5, and it was extracted with 0.01M calcium chloride solution, the P_2O_5 concentration in the extract would be of the order of $1.7 \times 10^{-5}M$, or about 10 times as much as required for plant growth. Now, on this basis alone hydroxyapatite would be considered as good a source of phosphorus on acid soils as the more soluble kinds. However, this would be true if it could dissolve at a sufficiently rapid rate to maintain the P_2O_5 concentration in the soil solution at the optimal level: that is, if it liberated phosphate ions more rapidly than phosphate ions are removed from solution by fixation reactions

⁷ H. C. Aslyng. Ybk. Roy. Vet. Agr. Coll. Copenhagen, 1964, p. 1.

Table 3.
Proposed Scale of Fertilizer Values.

Material	Points for soluble P_2O_5	Points for P_2O_5 decomposed		Points for P_2O_5 as rock phos.	Total points (acid soil)	Value in calcareous soil
		a) as dical. phos.	b) as OH-apatite			
$NH_4(H_2PO_4)_2$	100	—	—	—	100	100
$Ca(H_2PO_4)_2$	72	25	—	—	97	93
$Ca(HPO_4)$	70	—	18	—	88	76
$Ca_3(PO_4)_2 \cdot OH$	—	—	60	—	60	20
Rock Phosphate	—	—	—	20	20	10

and by uptake by plants. Because it seems unable to do this, it is classed as less satisfactory than superphosphate even on acid soils. For this reason Dr. Raistrick gave it a value of 60 in Table 3, which is fair to it.

Comparison with Plant Trials

IT is important to emphasize that the data in Table 3, the potential fertilizer values of the several phosphates may differ under some conditions from the results of pot tests or field experiments. Laboratory results cannot substitute for field data because of the difference in conditions. The choice of a test crop is one of the many variable factors to assess properly. Experimental errors are another factor that prevent or preclude the possibility of making accurate comparisons among fertilizer materials.

Dr. Raistrick did make comparisons, and with the results drew up a table of values shown in Table 4, similar in some aspects to the values in Table 3. He points out that this scale of fertilizer values neither confirms nor disproves the values in Table 3, but merely gives in general terms an indication of how they may be used in practice. Two test crops were used, each grown on an acid soil (pH 5.0) and on a calcareous soil (pH 7.6). The data in Table 4 represent yield increases due to different fertilizers calculated as percentages of the yield increases induced by an equal amount of P_2O_5 as $NH_4H_2(PO_4)_3$. Two of the fertilizers were not mentioned in Table 3; the residue from ammoniated fertilizer represents the portion remaining from the repeated extractions with water of a $7\frac{1}{2}$ -7-12 fertilizer. Washing stopped when the P_2O_5 concentration of the wash water showed that no phosphate remained in the residue that was more soluble than dicalcium phosphate. The residue itself contained 10.4% P_2O_5 (4.9% citric acid soluble P_2O_5 and 0.3% water soluble P_2O_5), and it was estimated that the residue contained about one third of the total P_2O_5 originally present in the fertilizer. The other additional fertilizer is nitrophosphate made from nitric

acid, phosphate rock, ammonia, ammonium sulfate and potassium chloride. Dr. Raistrick used a method for estimating the values in Table 4, which is described further along. The pot culture values for each material on each soil in this table represent mean values averaged over the two test crops.

Dr. Raistrick points out that despite the differences between the relative potential values of Table 3 and the yield increase values of Table 4, due primarily to the difficulty of drawing general conclusions about fertilizer values when too few tests are involved, the approximate agreement between the two sets of values is agreeably interesting. It is hoped more data from field tests on plant responses will become available and be coordinated to permit better assessment of the reliability of the scale of values of Table 3, some of which undoubtedly will need revision when more experience is obtained.

Evaluation of Mixtures of Fertilizer Calcium Phosphates

IF the ingredients are known, the value of a fertilizer based on calcium phosphate can be assessed from the data of Table 3. Dr. Raistrick uses an example to show how it may be calculated: If the fertilizer contains 75% of its P_2O_5 as monocalcium phosphate, 10% as dicalcium phosphate, 8% as hydroxyapatite, and the remaining 7% as unacidulated phosphate rock, its potential availability on an acid soil would be:

$$(75 \times 0.97) + (10 \times 0.88) + (8 \times 0.60) + 7 \times 0.20 = 88.$$

On a calcareous soil it would be:

$$(75 \times 0.93) + (10 \times 0.76) + (8 \times 0.20) + (7 \times 0.1) = 80.$$

The one difficulty in all this is to be able to analyze the mixture of phosphates so as to identify and measure the separate phosphates. It is a problem. Repeated extractions with water which separates the components into three groups helps give an approximate analysis of the mixture: this depends on whether the solubility as measured by P_2O_5 concentration in the extracts is (1) greater than, (2) equal to, or (3) less than that of dicalcium phosphate. If

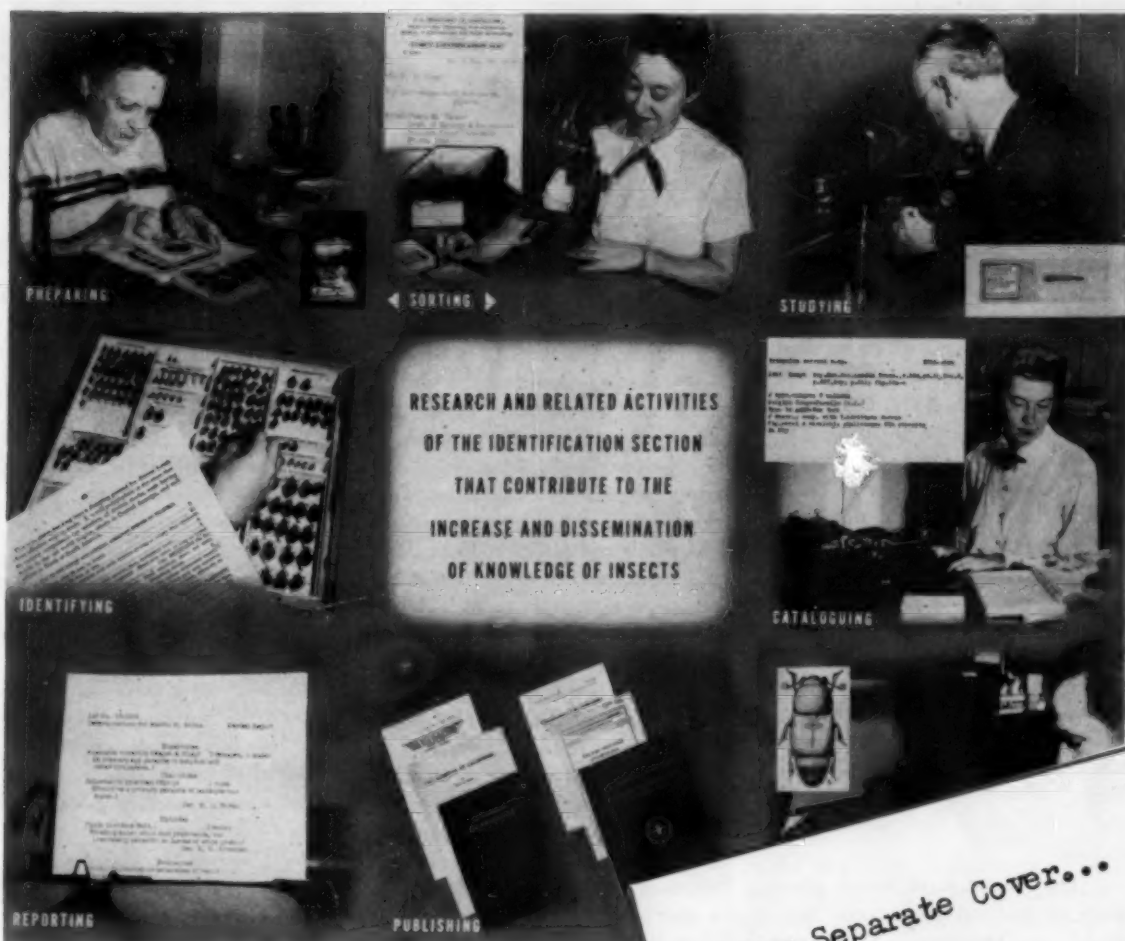
greater than, it is assumed to be monocalcium phosphate and is normally removed in the first two extractions; if equal to, the phosphate is considered as dicalcium phosphate; and if less than, it is assessed as hydroxyapatite.

If considerable dicalcium phosphate is present, it will require a large number of extractions to dissolve it, making the method tedious. Furthermore, as the amount of solid dicalcium remaining decreases, so does the P_2O_5 concentration of the extracts, and this makes it almost impossible to get a clear-cut division between the dicalcium and hydroxyapatite. To be practical about it, Dr. Raistrick assumed that as a first approximation, only the phosphate giving the required P_2O_5 concentration in the first 12 successive extractions is to be evaluated as the dicalcium, and the remaining undissolved phosphate is to be considered as hydroxyapatite. Such an approximation was used in setting up the estimated values of the fertilizer residues and the nitrophosphate in Table 4.

In practice the only serious error in the method is when the basic calcium phosphates (including unacidulated phosphate rock) make up the major portion of the total phosphate and the soil involved is calcareous, because for these the value given to dicalcium is almost four times that for hydroxyapatite. Hence any error in the determination of these two compounds will result in a serious error in the estimated fertilizer value.

Much more experimental work is needed before this method of assessment can be usefully applied to fertilizer materials of unknown composition containing considerable amounts of slightly soluble phosphates. To be able to determine dicalcium phosphate, phosphate rock, and hydroxyapatite in the presence of each other is particularly important. It is suggested that a dilute acetic acid-sodium-acetate-ammonium oxalate solution may prove to be a useful extractant for making this separation and identification. The essential property of a solvent for this purpose is that it be able to extract

(Continued on Page 95)



Under Separate Cover...

EACH year the Federal Insect Identification unit receives thousands of letters, memoranda and informal notes that begin with "Under separate cover we are sending ———." The verbiage may vary, but the gist of the communication remains the same—insects and their relatives, samples thought to be insects, or materials damaged by or containing insects, are being sent for examination and identification. Telephone calls from nearby localities contribute additional hundreds of requests for information, making the business of identifying insects one of the major quiz programs on the American scene.

Requests for the answer to "What is it?" are not limited geographically, or by season. Neither do

they originate solely with the scientific public. They come from all over the world, and should interplanetary travel bring to light life resembling insects, it is safe to assume that the area covered will be even further expanded. The materials sent include organisms being studied by research entomologists, those involved in surveys and control and regulatory programs, those encountered by householders, and many others. Almost as many specimens are received in January as in July.

The object in asking "What is it?" may stem from need for guidance in program operations, a desire for relief from annoyance or damage, or just plain curiosity. All the requests have one element in common—the identity of the organism must be

by P. W. OMAN

Entomology Research Div. USDA

Under side of labrum of *T. granarium* showing circular plate with four papillae. (Photo taken at 660 diameters magnification by T. J. Spillman.)



established in order to determine what if anything is known about it. Once the identity of an insect is established, that knowledge opens the door to whatever information may have been accumulated regarding its habits, distribution and means of control.

During 1956, in response to requests such as those indicated above, the Federal insect identification unit reported 86,686 identifications, involving examination of an estimated half million specimens. This material was received in about 16,000 separate submittals. In 1955, there were 89,401 identifications; in 1954, 84,911. To appreciate fully the demand for information about insects, it is necessary to keep in mind that these records reflect only the activities of the federal organization, and do not include the thousands upon thousands of identifications made by county agents, state agencies, and entomologists at museums, colleges, universities and elsewhere. The following table shows a breakdown of the material handled by the federal unit during 1954-1956, with an indication of the sources from which it was received.

The condition in which specimens are received varies from "wonderful" to "atrocious." Those from housewives are sometimes attached to the letter of transmittal by a piece of Scotch tape, or contained in a bag or box along with sweepings of various kinds of debris. Even specimens received from entomologists, who

Source of Material	Number of Identifications		
	1954	1955	1956
Plant Quarantine and Plant Pest Control	10,761	13,983	16,517
Entomology Research Branch	10,823	22,849	6,230
Other Federal Agencies	6,023	6,544	5,049
States and Insular Possessions	39,664	30,426	36,055
U. S. Individuals	10,993	10,097	16,734
Foreign Agriculture and Individuals	6,647	5,502	6,101
	84,911	89,401	86,686

should know how to collect, preserve and ship samples of insect populations, often leave much to be desired. Those desiring identifications should realize that the adequacy of the answer is often in direct proportion to the condition and adequacy of the sample supplied for examination. Disregarding the rodent droppings, damaged plants and plant products, damaged fabrics and other items that are not insects as such, but which are received for identification, the task of supplying the answer to "What is it?" is still a monumental one.

If insects showed some tendency to conform to reasonable numbers of kinds, identifications might, in time, be relatively simple. However, not only do insects and their relatives exist in seemingly countless kinds,* but each kind may be represented by any of several different stages. These circumstances, coupled with the normal variability of populations within a species, lend credence to Allen's Law** which states "Everything is more complicated than it seems to most people." How complicated is this business of identifying insects?

Usually insects are identified by examination of details of their structure, which are outward signs of physiological characteristics that make a species what it is. Of course, insects can often be identified by other means . . . by their habits, their biology, their food preferences, the damage they do, and so on . . . and sometimes differences in the biologies of closely related species are known before a way to separate them on the basis of structure is discovered. However, it is nearly always possible to find anatomical characteristics that

will distinguish seemingly identical species, and taxonomists normally depend upon that method. Frequently, the characters relied upon to separate species, or to detect relationships, are very minute.

The khapra beetle, an unusually destructive stored grain pest, is normally encountered only in the larval stage. The identification of the pest, a necessary step in support of the premise quarantine and eradication program currently under way against it, must, therefore, in most cases, be from examination of larvae. In order to separate this species from its close but less voracious relatives, it is necessary to determine, among other things, whether there are four or six minute papillae on a tiny circular plate on the under side of the labrum of the larva. To accomplish this diagnosis it is necessary to remove from a specimen, which is about 3/16 inches long when fully grown, the labrum, or "upper lip," mount this part on a microscope slide, and examine it under the "high-dry" magnification of a compound microscope. Decisions concerning the expenditure of thousands of dollars for eradication procedures depend upon examination of such minute anatomical details.

To identify scale insects, eleyrodids, aphids and many other kinds of small insects and mites with certainty, it is necessary to mount the specimens on microscope slides so that they may be examined with a compound microscope, often using phase contrast equipment, or the oil immersion lens with a 1000 diameter magnification. Leafhoppers and their relatives often require examination of the structures of the internal genitalia of the male, and the same is true of mosquitoes, sandflies, true bugs and

(Continued on Page 93)

Dr. R. S. Beal, Jr., specialist on the taxonomy of beetles that attack stored grain, examines khapra beetle specimens. (USDA).



*Sabrosky, C. W., How Many Insects Are There? In *Insects*, The Yearbook of Agriculture, 1952, pp. 1-7, U.S. Dept. Agric., Wash.

**Dollard, Charles, *Scientific Monthly* 82 (6): 279, 1966.

IN addition to hexachlorobenzene 40 per cent and pentachloronitrobenzene 75 per cent, and tetrachloronitrobenzene 50 per cent, three standard mercury preparations were included in the 1953-54 tests at several rates of application. The results generally confirmed those of the previous year. Although smut control by hexachlorobenzene and pentachloronitrobenzene in these tests was not complete at any rate of application, both of these materials greatly reduced the percentage of infection by soil-borne spores when applied at rates of one ounce or more per bushel, hexachlorobenzene being the more effective of the two at the lower rates. In contrast, the three mercury preparations used and also tetrachloronitrobenzene were ineffective against the soil-borne inoculum.*

In 1953-54, further tests also were made with seed application against seed-borne common bunt and with both soil and seed application against the soil-inhabiting dwarf bunt. The unpublished data from these tests again emphasized the highly effective action of hexachlorobenzene 40 per cent at one-half ounce or more per bushel against infection by seed-borne spores of common bunt. Likewise, its superiority in soil application against infection by dwarf bunt, even at rates as low as five pounds to the acre, was confirmed. Unfortunately, however, it was not effective against dwarf bunt when used as a seed dressing, thus suggesting a difference in time of infection by common and dwarf bunt. It was shown again by these tests that pentachloronitrobenzene 75 per cent was as effective as hexachlorobenzene 40 per cent only at the higher rates of application. Therefore, from these and previous experiments in more or less localized areas the proof was convincing that infection by soil-borne spores of common bunt of winter wheat in the Pacific Northwest can be greatly reduced by treating the seed with a chemical preparation. There remained the task of demonstrating the effectiveness of hexachlorobenzene and similar materials on a broad regional scale and in commer-

Control of Wheat Smut in the Pacific Northwest

by C. S. Holton
Agricultural Research Service

Conclusion of a 2-part article starting in the July issue

cial application as well. Both of these have now been done, as shown below.

Ten regional seed treatment nurseries were established in the fall of 1954 in Oregon, Washington, Idaho, Utah, and Montana. The results the next summer showed again that hexachlorobenzene 40 per cent, applied to the seed at one ounce per bushel, is equal to or better than the other chlorobenzenes or the standard mercury preparations in controlling infection by both seed-borne and soil-borne spores of common bunt of winter wheat throughout the region. This was true where treated inoculated seed was planted in smut-free soil, where smut-free treated seed and inoculated treated seed were planted in smut-infested soil. In the tests in which seed-borne spores alone were involved, the degree of infection was reduced from 84.5 per cent to less than one per cent by the various hexachlorobenzene 40 per cent formulations and the mercury preparations alike. Where only soil-borne spores were involved, infection was reduced from 53.3 per cent in the control plots to within a range from 2 to 10 per cent in the various hexachlorobenzene-treated plots and there were no significant differences in the brands used. All other treatments, including the mercury preparations, were ineffective. Similar results were obtained from the test where both seed-borne and soil-borne spores were involved.*

In the regional tests in 1955-56, hexachlorobenzene 40 per cent again

was superior to other chemical preparations over the entire region, primarily because of its effectiveness against soil-borne sports of the common bunt. Pentachloronitrobenzene in a 75 per cent formulation was second only to hexachlorobenzene 40 per cent at the same rates of application. This material was comparable with hexachlorobenzene only at higher rates.*

It has been postulated that the effectiveness of polychlorobenzene in controlling wheat smut is associated with the number of chlorine atoms in the molecule. Hexachlorobenzene, with six chlorine atoms is the most effective and is followed in that order by pentachlorobenzene and tetrachlorobenzene, which have five and four chlorine atoms, respectively. Apparently the substitution of one nitro group for one chlorine atom also reduces effectiveness against wheat smut, because pentachloronitrobenzene was less effective than hexachlorobenzene. Tetrachloronitrobenzene was just slightly more effective in control than tetrachlorobenzene and both of these were inferior to hexachlorobenzene, pentachlorobenzene, and pentachloronitrobenzene.**

To help bridge the gap between the promise of experimental results with hexachlorobenzene, and its practical utilization on a commercial scale, a seed dealer in Oregon treated portions of the same lot of seed wheat with two standard mercury products and two brands of hexachlorobenzene 40 per cent for the 1954-55 crop.

* Plant Disease Reporter 38: 753-754, 1954.

* Plant Disease Reporter 39: 844-849, 1955.

* Plant Disease Reporter 40: 998-1000, 1956.

** Phytopathology 46: 28, 1956.

This treated seed was planted in alternate drill strips on two farms where the soil was naturally contaminated with spores of common bunt. There was markedly less smut in the hexachlorobenzene strips than in the mercury strips, the percentages on one farm being 15.7 and 2.8 respectively. On the other farm these figures were 5 and 0.3. Since all of the materials used in this large scale test are highly effective against seed-borne spores, the differences in smut incidence observed must have been due to the better protection against soil-borne spores provided by hexachlorobenzene.* Additional commercial field comparisons were arranged for the 1955-56 crop in another area where soil infestation is a more severe problem. In every case there was significantly more smut in the crop from the mercury-treated seed, the differences ranging from four to ten times greater than in the hexachlorobenzene-treated parts of the various fields. In these results, however, there was evidence that the present methods of commercial utilization of hexachlorobenzene must be improved if the maximum potential protection offered by this material is to be realized. The mode of action of hexachlorobenzene in controlling wheat smut may be pertinent to this problem.

In the long tenure of the ethylmercury products as the standard seed treatment materials for wheat smut control in the Pacific Northwest much emphasis was placed on the importance of volatility in their effective performance. With treating machines that process several hundred bushels an hour, thorough coverage of the seed is improbable, at the prevailing recommended low rate of application (one-half ounce per bushel). Because of this, much of the effectiveness of these materials was presumed to depend on the toxic action of their volatile products. Doubt was cast on this long-held belief, however, by the demonstrated effectiveness of hexachlorobenzene, which has a very low vapor pressure, and consequently is not highly volatile. This seemed to preclude the possibility that immedi-

ate and widespread vapor action was the basis for the effectiveness of hexachlorobenzene at low rates of application. Thus, at this point it appeared that either the importance of vapor action in the effectiveness of the volatile mercury products had been over-emphasized, or else the mode of action of these materials against wheat smut was significantly different from that of hexachlorobenzene. Experiments have shown, however, that despite its low vapor pressure, vapor action is important in the toxic action of hexachlorobenzene against wheat smut spores. This may be especially true in the control of dwarf bunt as a soil treatment and in the control of soil-borne common bunt as a seed treatment.

Under laboratory conditions, the vapor of hexachlorobenzene inhibits the germination of wheat smut spores in varying degrees, depending on the concentration in a given volume of air-space. This was determined by tests in Petri plates containing spores on an agar medium suitable for their germination together with measured amounts of pure hexachlorobenzene. Since there was no direct contact between the solid form of the chemical and the agar medium or the spores, any toxic effects on spore germination must have been due to vapor action. The results showed clearly that hexachlorobenzene vapor in this test was toxic to wheat smut spores, and that the degree of this toxicity was related to the amount of the chemical present and length of exposure. Thus, in the plates containing no hexachlorobenzene 89.4 per cent of the spores germinated, whereas in the plates containing 0.1, 1, and 5 mg of hexachlorobenzene the germination percentages were 32.5, 17.2, and 7.4, respectively. A minimum of 10 mg was required to completely inhibit spore germination in a 10 cm dish incubated at 20° C. Temperature ranges of 10°-20° C did not influence the toxic action of the vapor. It did, however, influence markedly the vapor pressure, and therefore probably the effectiveness of hexachlorobenzene within the range of 5°-15° C. Length of exposure was

also important, the longer the exposure the more effective the action.*

It was concluded from the above study that the control of both dwarf and common bunt of winter wheat by hexachlorobenzene probably is due primarily to inhibition of spore germination by vapors released by sublimation. Theoretically, then, the degree of control in the field would depend on the concentration of the vapor in the vicinity of the seed or seedlings in the soil. The vapor concentration at any given time would be determined by the rate of sublimation, which may be influenced by temperature, and probably by soil moisture and soil texture also. This suggests therefore that the importance of volatility in the various seed treatment preparations used for wheat smut control is in neither the degree nor the rate of volatility, but rather in the toxic properties of the volatile products. In this respect, hexachlorobenzene must be in a class alone, since it controls wheat smut over a wider range of conditions than does any other material used for this purpose.

In connection with vapor action considerations, mention should be made of some results of a study dealing with the effect of vapors of several seed treatment materials on spore germination and control of wheat smut.** In these tests, the vapors from one mercury preparation [2.2 per cent cyano (methylmercuri) guanidine] were highly effective in preventing spore germination in agar culture. Hexachlorobenzene completely inhibited germination and the mercury preparation permitted only small percentages of germination. There was no vapor action against germination by two other mercury preparations [7.7 per cent N-(ethylmercuri-p-toluenesulfonanilide) and [6.7 per cent phenylmercuriurea], as indicated by the fact that the spores in these plates and in the control plates germinated upwards of 50 per cent.

When wheat kernels dusted with smut spores were similarly exposed

(Continued on Page 97)

* Plant Disease Reporter 39: 842-848, 1955.

* Plant Disease Reporter 37: 65-66, 1953.

** Phytopathology 46: 385-387, 1956.



SUBURBAN TRENDS

The first in a series of articles describing agricultural chemical companies who have recently moved offices or laboratories to suburban areas.

Exterior day and night view of Geigy's two story administration building which in addition to its many offices, contain an auditorium and lecture hall, seating 100 people. It is connected by glass walled corridors with the laboratory and cafeteria buildings. All buildings are air conditioned, with sound proof ceilings. The Geigy buildings at Ardsley cover 137,000 square feet on a 42-acre tract.

Modern up-to-date instruments in all of the Geigy Ardsley laboratories assure the best in research, technical service, quality control, and development.

Geigy

AT ARDSLEY



THE growing enthusiasm for suburbs—and, more recently, ex-urbia—is not confined to home buyers. It is shared by large industrial companies seeking room for horizontal expansion on one or two floors as compared with cramped, dirty loft buildings in cities, with offices and plant on five or six crowded floors.

With few exceptions, the whole trend of the country is away from the city. Signs of the times are housing developments in areas that used to be thought of as the hinterlands, shopping centers on land that only shortly before was a woods or swamp, and modern, one-story factories that are as handsome as any private dwelling.

One of the most notable moves of this type was made in the agricultural chemicals industry by Geigy Chemical Corp. which recently occupied a brand new plant and offices in suburban Ardsley, N. Y., a quiet town just up the Hudson River from New York and easily accessible by a choice of thruways and the N. Y. Central Railroad.

Geigy is just one of many firms in our industry who have moved out to suburbs. Other typical examples include: General Chemical Company's research and testing laboratories in Morristown, N. J.; Spencer Chemical Company's new research center in suburban Johnstown County, Kans.; the Phosphate Division of Davison Chemical

Co. in Ridgewood, Fla.; Atlas Powder's new technical center in suburban Wilmington; Bemis' new bag plant in Flemington, N. J.; Stauffer Chemical Company's offices on the Hudson, N. Y.; and Olin Mathieson's Biological Testing Station at Port Jefferson, L. I. Doubtless other companies will follow suit when all the benefits of suburban living have been demonstrated to them.

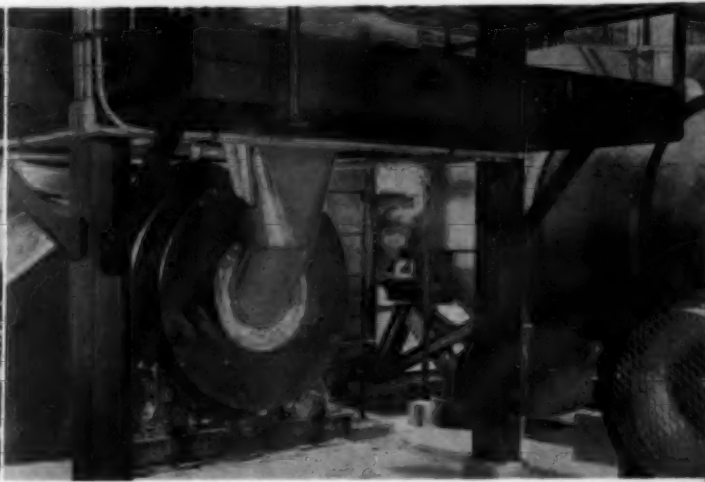
Biggest advantage, as Geigy has found at Ardsley, is room for expansion, of both laboratory and office facilities. Recreational facilities and the general atmosphere of a "country-club" contribute a strong appeal for potential employees.

About a year ago, Geigy moved its main offices from downtown New York to the 42-acre hillside tract overlooking the Saw Mill River Valley. Not only is there more room for all departments, but an almost unlimited supply of land for possible future expansion.

Photos show representative scenes in the handsome building, which covers 137,000 square feet and is constructed of reinforced concrete with exteriors of insulated white porcelain enamel panels. Large areas of clear plate glass provide ample light for all workers. Soft colors, carefully harmonized, give the offices a unified appearance, and provide a restful background.



The compactly arranged pre-dryer (right background), dryer (right foreground), and cooler (lower foreground) are used to dry and cool prilled ammonium nitrate.



A link-belt revolving mixer coats dried and cooled ammonium nitrate prills with diatomaceous earth. This coating prevents the prills from adhering and makes them free-flowing.

Prilling Ammonium Nitrate

A NEW industrial landmark has gone up in California's Orange County, a rich farming area southeast of Los Angeles. The landmark, a gleaming aluminum tower, stands 200 feet above the surrounding countryside and serves as a practical "monument" to chemical engineering achievement.

Possibly the world's tallest processing unit fabricated from aluminum, the tower is used for prilling ammonium nitrate at Brea, Calif., by the Collier Carbon and Chemical Corporation, Los Angeles, Calif. Collier Carbon and Chemical Corp. was formed on July 1 by a merger of two Union Oil Company of California subsidiary corporations, Brea Chemicals, Inc., and the R. T. Collier Corp.

The equipment employed at the Brea plant was specially designed to efficiently handle and produce the high grade fertilizer. The processes that occur before and during the

prilling tower operation make an interesting story of applied chemistry.

From steam and natural gas Collier derives hydrogen which is catalytically combined at high temperatures and pressures with nitrogen separated from the atmosphere to produce ammonia, one of the basic raw materials of ammonium nitrate. Atmospheric air is the other raw material.

The ammonium nitrate process begins by reacting ammonia with compressed air in the presence of a platinum-rhodium catalyst. Large centrifugal air compressors operate at 11,000 r.p.m. to supply the volume of compressed air needed in the process.

The reactor, in which the air and ammonia are combined, contains a $\frac{3}{8}$ inch thick pad, composed of 30 layers of a 90 per cent platinum and 10 per cent rhodium gauze. The cost of each such catalyst pad is \$25,000. Within this reactor, ammonia and

compressed air burn to produce nitric oxide and water vapor. Nitric oxide, after cooling, is further oxidized with air to form nitrogen dioxide. Nitric acid, which results when the nitrogen dioxide is absorbed in water, is then combined with additional anhydrous ammonia to form an 83 per cent solution ammonium nitrate. This solution is further concentrated by evaporation under vacuum to 95 per cent ammonium nitrate.

To form the ammonium nitrate into prills, the 95 per cent solution, at a temperature of approximately 250 degrees F., is sprayed through nozzles at the top of the tower. Dropping through the tower against an upward draft of air, the ammonium nitrate droplets cool to approximately 175 degrees F. and solidify into prills. The prills at this point in the process contain about five per cent moisture, which must be removed.



Collier chemists install a fresh pad of catalyst in a reactor where ammonia and compressed air burn to produce nitric oxide and water vapor. The pad is 90 per cent platinum and costs \$25,000.

The 200-foot prilling tower in the background (right) is said to be the world's tallest aluminum processing unit.



At Brea

A pre-dryer, dryer, and cooler, are used in successive stages to dry and cool the prills. The units at the Brea plant are Link-Belt Roto-Louvre dryers manufactured by the Link-Belt Co., Chicago. Prills are removed from the bottom of the prilling tower on a belt feeder which discharges to an oscillating conveyor fitted with an aluminum bar scalping screen.

Oversize clumps of prills are separated, dissolved, and reprocessed, while the onsize prills enter the pre-dryer which is designed to dry approximately eight and one half tons of ammonium nitrate per hour. The pre-drying stage reduces the moisture content from five per cent to approximately 2.75 per cent.

In the dryer, the moisture content is reduced to .5 per cent. As the ammonium nitrate leaves the third stage of drying accomplished in the cooler, the moisture content is reduced to .3 per cent and the temperature is lowered to 115 degrees F.

The drying and cooling process is automatically controlled by the use of automatic temperature and air volume controls. To keep operating costs at a minimum, only the proper amount of heat is applied - at any given time. The cooling medium is controlled in a similar manner.

A system of four specially-designed tubular Flexmount oscillating conveyors, 12 inches in diameter, are installed to move the prills from the pre-dryer, to the dryer, to the cooler, and to the revolving mixer. These conveyors were constructed in a special tubular form to provide ease in sealing. Air-tight seals were desired for two reasons—to confine the product and to maintain the proper air balance between the pre-dryer, dryer, and the cooler. Neoprene seals are used on both ends of the conveyors where they link up with the roto-louvre dryers.

The conveyor troughs, made of aluminum tubing, are lined to pre-

vent the buildup of prills. An inspection window is built into each conveyor.

A Link-Belt continuous bucket elevator delivers the cooled prills to a Link-Belt UP double deck vibrating screen with stainless steel cloth. Onsize prills then pass into a storage hopper.

Diatomaceous earth is handled from a loading hopper to an overhead storage hopper by means of a Link-Belt Bulk-Flo conveyor. A gravimetric belt feeder proportions the feed of diatomaceous earth to ammonium nitrate prills as they discharge onto a belt feeder which empties into a feed chute at the inlet end of a revolving mixer.

The prills are finally coated with diatomaceous earth in the mixer to prevent them from adhering and to make the prills free-flowing, a major concern of farmers. After this final stage of processing the prills are ready for packaging in 80-pound bags.★★

Lima bean field showing control of root-knot nematodes by use of 20 gallons per acre of dichloropropene-dichloropropane fumigant left of stake compared to untreated, right of stake. Photo courtesy of Shell Development Company.



SOIL FUMIGATION

THE early history of the development of soil fumigation as an effective method of controlling plant parasitic nematodes was reviewed for *Agricultural Chemicals* by Taylor (1952). Since that date some new materials have been introduced, some requiring modification of existing methods of application. Additional modifications in application procedures also have been made to permit wider use of existing fumigants on crops with low per acre returns. Most of the following discussion and data are concerned with crops under California conditions.

Experience has shown that for annual vegetable and field crops, applications of nematodes in excess of the amount necessary to insure one economic crop are not feasible. Consequently, treatments are designed for application of a minimum amount of chemical so that they may fit into the production cost limitations of these crops. Because of the expense, for such crops as tomatoes and sugar beets, growers are hesitant to pay for the relatively expensive soil treatments available. Adequate control is not possible, with less than the now recommended dosages of 20 gallons per acre for the dichloropropene-di-

chloropropene or 3 to 4 gallons of ethylene dibromide. Therefore, reductions in treatment costs must be obtained by modifying application methods to reduce total amounts applied per acre, or by the development of cheaper and/or more effective materials. During the past 4 or 5 years, some degree of success has been obtained in both of these areas.

For perennial plantings, including important tree and vine crops such as citrus, peaches, walnuts, and grapes, higher treatment costs can be justified by the grower. For such crops, because of the high costs involved in establishing orchards and vineyards which will yield for 20 years or more, considerable expense can be tolerated to establish productive plantings. In addition to pre-planting treatments, there also is urgent need for a treatment which may be applied to living plant sites to aid in bringing back to economic productivity vines and trees declining in vigor from nematode attack.

New Materials: Until recently, no chemical was available which could be applied safely to sites of living plants. McBeth and Bergeson (1955) reported the development of 1,2-dibromo-3-chloropropene, which could be

by Bertrand Lear

Department of Plant Nematology
University of California
Davis, California

applied to living plant sites in nematocidal amounts without injury to certain plants. They list this heavy liquid as being 8 to 16 times more effective than ethylene dibromide. In a series of experiments for control of root-knot nematodes on tomatoes, Lear and Thomason (1956) report excellent control with $\frac{3}{4}$ gallon per acre. Root scores and tomato yields taken from one experiment conducted in the San Joaquin Valley showed treatment with this dosage gave 89 per cent control, compared with 37 per cent control for dichloropropene-dichloropropane at 20 gallons, and 32 per cent control for ethylene dibromide at 6 gallons of the 83 per cent mixture. In the same test, dosages as low as $1\frac{1}{2}$ gallons per acre gave 95 per cent control, but yields were significantly depressed. Other crops showing intermediate sensitivity include cole crops. Crops showing high sensitivity to this material include onions, garlic, sweet potato, Irish potato, and sugar beets.

Data taken from plots treated to control stem and bulb nematode demonstrate the sensitivity of garlic to this fumigant. Application of five gallons per acre was made in May and garlic cloves were planted in December. Even though the number of bulbs discarded, because of nematode damage, was 9 compared to 20 harvested from 200 feet of row for dichloropropene at 50 gallons per acre, the yield was 11 pounds less commercial garlic than produced on the dichloropropene-dichloropropane treated plots. Definite depression of growth

was evident both in tops and resulting bulbs.

For use as a pre-planting treatment on cotton, Allen, Burton, and George (1955) found an area treatment of dibromochloropropane at $1\frac{1}{4}$ gallons per acre as effective in nematode control as dichloropropene-dichloropropane at 20 gallons and 83 per cent ethylene dibromide at $5\frac{1}{2}$ gallons per acre.

Raski (1954) found application of 10 gallons per acre as a re-plant treatment for Thompson Seedless grapes produced better nematode con-

trol than dichloropropene-dichloropropane at 60 gallons and ethylene dibromide at 9 gallons per acre, but the resulting vine growth was not improved over untreated checks, probably due to chemical toxicity. Raski concludes from a series of 5 re-plant experiments, that a satisfactory re-plant treatment is not yet available. In the one plot where vine growth response was greatest, a 3-year rotation elapsed between the time of vine pulling and fumigation. He suggests that non-rotted root tissues protect nematodes from fumigants.

for nematode control



Another newly introduced chemical is sodium n-methyl dithiocarbamate. This chemical is water soluble and is most stable and commercially available as a water solution containing 4 pounds active ingredient per gallon. Most effective results have been obtained through application of this chemical in water, either by flooding or overhead sprinkler. It is also an effective herbicide and fungicide. Lear and Thomason (1956) found that field applications by conventional injection methods, plow application, or disc application were not effective for control of root-knot nematodes on tomato. Comparable amounts, however, were effective when introduced in overhead water sprinklers as a constant flow while the sprinklers were in operation.

The writer obtained good control of stem and bulb nematode on garlic with sprinkler applications of sodium n-methyl dithiocarbamate at rates of 300 and 400 pounds per acre. A dosage of 200 pounds was not effective. At the 400 pound rate (1784 ppm) the amount of commercial garlic produced on 300 feet of row was 72 pounds compared with 102 pounds for the 300 pound rate (1340 ppm) and $\frac{1}{2}$ pound for the untreated checks. It was evident from the yield results and appearance of

the garlic that the chemical at 400 pounds per acre had caused injury.

Baines, Foote, and Martin (1956) found that this chemical eradicated citrus nematode on sandy loam soils to a depth of 4 feet at a rate of 50 gallons (200 pounds) in 6 acre-inches of water. At double this dosage in 12 acre-inches of water, the citrus nematode was eradicated to 7 feet.

In a series of greenhouse tests, Lear (1956) found that sprinkling flats of nematode-infested soils with a solution of this material eradicated root-knot nematodes from potting soils at the rate of $\frac{1}{2}$ pound per 100 square feet. In tests conducted in soil columns, it was effective no further than the water penetrated. The initial soil moisture was therefore important at the time of treatment. Diffusion patterns of a 4 ml dosage showed a lateral diffusion of 6 to 8 inches, but only about 4 inches vertically.

Another recently introduced product is a dichloropropene material containing 90-95 per cent of 1,3-dichloropropene. Baines, Foote, and Martin (1956) found that only 80 per cent of the dosage of dichloropropene-dichloropropane fumigant is needed for similar kills of citrus nematode. Tests with this material on other crops and nematodes are incomplete.

Row Placement Applications: This method of applying fumigants only to rows or spots where plants will be growing is by no means a recent modification in application. Such applications have, however, been adapted for use on a wider variety of crops with resulting economies of treatment. It is imperative that treated rows be marked so seeds or transplants may be placed in the treated bands of soil. The risk of losing the value of such treatments is greater than with solid or broadcast applications. This is especially true with direct-seeded crops, where if for some reason poor stands may necessitate reworking the soil so replanting may be accomplished. Tomatoes, where root-knot nematodes often cause severe losses to both canning and fresh market plantings, is a crop where considerable savings can

be realized by use of such applications. Here the plants are grown at wide row spacings, 5 to 6 feet, and effective row-placement applications for direct-seeded and transplanted crops have proved feasible. In a series of experiments conducted in several areas of California, Lear and Thomas (1956) obtained almost equal nematode control and fruit yields with row-replacement applications of dichloropropene-dichloropropane, ethylene dibromide, and dibromochloropropane as with solid or area applications of the same materials. In one experiment, a 20-gallon area application of dichloropropene-dichloropropane and a row application of 5.7 gallons resulted in nematode control of 36 and 40 per cent, respectively. Fruit yields from the two treatments were almost identical. Area applications of six gallons of 83 per cent ethylene dibromide and 1.7 gallons in the row resulted in 81 and 77 per cent control, respectively. Yields were 73 boxes per plot for the area treatment and 71 boxes per plot for the row application.

Raski and Allen (1953) report excellent results with row applications of 9 to 12 gallons of dichloropropene-dichloropropane for control of root-knot nematodes on cotton. In one experiment conducted in the San Joaquin Valley, they obtained yields of 3.07 bales from use of 12 gallons in the row compared with 3.35 bales from an area application of 20 gallons. The check plots produced 1.87 bales. These authors also point to another undesirable result of using row applications, at least for cotton. The non-rotted roots and plant parts tend to catch on the chisels, especially where more than one chisel per bed is used. This may disturb the bed formation, causing the soil to dry out too rapidly. It is also possible that the seed may be planted too deeply due to the looseness of the soil. In other experiments on cotton, Allen, Burton, and George (1955) obtained comparable nematode control using one shank per bed with dichloropropene-dichloropropane at nine gallons, 83 per cent ethylene dibromide at $2\frac{1}{2}$ gallons and dibromochloropropane at $\frac{1}{2}$ gallon per acre as with 20,

$5\frac{1}{2}$ and $1\frac{1}{4}$ gallons as area applications, respectively.

Split-Dosage Applications: With standard methods of injecting soil fumigants, it has long been established that they are least effective in the top one or two inches of soil. Dividing the amount of chemical to be applied into two applications with the soil being turned between applications has improved kills of nematodes in this surface layer. This method of application was used by Lear (1956) to control stem and bulb nematode, *Ditylenchus dipsaci*, which is a serious pest on garlic. Two 25-gallon applications of dichloropropene-dichloropropane were made 10 days apart, the soil being plowed between applications. Garlic yields on 200 feet of row were 93 pounds, with 20 bulbs being discarded due to nematode injury for the dichloropropene treatments. Untreated check plot produced 3 pounds of garlic with 861 discarded bulbs. A single application of dichloropropene-dichloropropane at 50 gallons per acre resulted in 76 pounds of garlic with 46 discarded bulbs.

Post-Planting Sidedress Applications: With the development of dibromochloropropane, side-dressing established plants, both annuals and perennial trees and vines, was possible. In such treatments on tomatoes, the author used both liquid and granular formulations of this material with applications being made two months after seeding. Both formulations were chiseled in rows eight inches deep on each side of the tomato row. Rate applied was at the $\frac{3}{4}$ gallon per acre, which amounted to a total dosage applied per acre of 0.3 gallons on the row spacings. Fruit yields and root scores, taken at the end of the season compared with pre-planting applications of the same amounts, indicate that sidedressing was of little value in the control of nematodes.

Because of the low phytotoxicity of this material to such trees and vines as peaches, walnuts, citrus, and grapes, the possible value of sidedressing applications is being explored fully. This research is currently in progress, but not complete enough to permit definite conclusions

Tomato Yields and Root-Knot Nematode Control In Fumigated Field Plots

Treatment	Gal./A.	Formulation	Root-Knot control (percent)	Tomato Yields (tons/A.)
Check	—	—	0	6.38
Dichloropropene-dichloropropane	20	liquid	47.5	14.26
Dibromochloropropane	0.75	liquid	37.3	9.75
"	0.75	granules	56.2	13.13
"	0.75	liquid (sidedress)	6.1	8.00
"	0.75	granules	6.9	8.40

as to the potential value of such applications. One possible deterrent to favorable response of such plantings to treatment may be the lack of root penetration as reported by Lear and Raski (1956). In greenhouse and field tests with roots of tomato and grapes recovered from soils treated with dosages up to 20 gallons per acre, many more root-knot nematodes survived in the roots than in the surrounding soil. At dosages of 20 gallons per acre, the chemical appeared to penetrate roots in nematocidal amounts. However, at this dosage tomato plants were injured severely.

Water Applications: Except for special usages, application of nematocides has been found to be most effective by injection. For those materials of low volatility, such as sodium n-methyl dithiocarbamate, water applications are effective, and its use has been discussed. The value of water applications following treatment are well known as necessary for sealing such materials as methyl bromide and chloropicrin. The use of water following application of dichloropropene-dichloropropane for control of citrus nematode has been reported of value by Baines, Foote, and Martin (1956). They report that increased kills on loam-type soils can be obtained to depths of six to eight feet by irrigating five to nine days after treatment. Enough water was used to penetrate to the eight to nine foot level. They found no benefit from water seals to moisten the top six or eight inches of soil.

New Application Equipment

APPLICATORS equipped with manifolds pressurized by means of pumps or gas cylinders in connection with orifice plates in the discharge lines are the best known of

all fumigant applicators. This type applicator is best suited for delivery of relatively high volumes. High-volume delivery gravity flow rigs also have been used extensively. On these, the delivery rate is usually regulated by calibrated needle valves. With the development of such materials as dibromochloropropane, where relatively low volumes are applied, some modification of existing application systems is desirable. The use of small orifices makes plugging of conventional applicators much more of a problem. Impregnation of fumigants on clay granules, vermiculite, and dry fertilizers necessitated development of suitable applicators either by modifying existing equipment or devising new applicators. To date, fertilizer and seed applicators have been modified to deliver accurately the desired amounts. Modification most often necessary is installation of longer chisels.

The following modified gravity flow applicators* appear to be definite improvements toward ease of calibration and accuracy of delivery of low volumes.

CONSTANT HEAD WITH METERING COIL: This system utilizes a coil of copper or plastic tubing of various lengths and diameter instead of a needle valve for calibration. The rate of flow of a given fumigant is controlled by the dimensions of the tubing in comparison with the liquid head and viscosity of the fumigant. The liquid head is adjusted by insertion of pipe nipples of calibrated lengths.

GROUND WHEEL DRIVEN METERING PUMP: A loose fitting multiple gear pump with an outlet for

*These gravity flow applicators are manufactured by Fabricated Metals, Inc., San Leandro, California, from plans developed by Shell Development Company.

each discharge line is driven by means of a ground wheel. The fumigant is pumped against a short liquid head to a vacuum-breaking manifold from which the fumigant is delivered to the chisels through tubes by gravity. The rate of delivery is regulated by sets of calibrated sprockets easily installed on the ground wheel and pump. Since the drive wheel is lifted when the chisels are raised, no shut-off valve is necessary. Variations in flow due to tractor speed variations are eliminated.

For use with both of these applicators, a float box has been developed which permits installation of the supply tank in any location. A uniform liquid head is maintained regardless of the liquid head in the supply tank. Prefabricated kits of parts are available for both these applicators.

References

- Allen, M. W., Vernon Burton, and Alan George. 1955. Nematode control on cotton. *California Agriculture* 9: 10, 14.
- Baines, R. C., F. J. Foote, and J. P. Martin. 1956. Fumigate soil before replanting to control citrus nematode. *The California Citrograph* 41: 427, 448.
- Lear, Bert. 1956. Split-dosage applications of soil fumigants to control stem and bulb nematode on garlic in California. *Phytopath.* 46: 18.
- Lear, Bert. 1956. Results of laboratory experiments with Vapam for control of nematodes. U. S. Dept. Agr. Pl. Dis. Rept. 40: 847-852.
- Lear, Bert and D. J. Raski. 1956. Survival of root-knot nematodes in grape and tomato roots recovered from soil fumigated with Nemagon. *Phytopath.* 46: 18.
- Lear, Bert and Ivan J. Thomason. 1956. Control by soil fumigation of root-knot nematodes affecting fresh fruit and canning tomatoes in California. U. S. Dept. Agr. Pl. Dis. Rept. 40: 981-986.
- McBeth, C. W. and Glenn B. Bergeson. 1955. 1,2-dibromo-3-chloropropane—a new nematocide. U. S. Dept. Agr. Pl. Dis. Rept. 39: 223-225.
- Raski, D. J. 1954. Soil fumigation for the control of nematodes on grape replants. U. S. Dept. Agr. Pl. Dis. Rept. 38: 811-817.
- Raski, D. J. and M. W. Allen. 1953. Control of root-knot nematode on cotton. U. S. Dept. Agr. Pl. Dis. Rept. 37: 193-196.
- Taylor, A. L. 1952. Progress and prospects in the chemical control of nematodes. *Agricultural Chemicals* 7: 39-41, 123.

*The A.A.C. Co. Plant at
Carteret, New Jersey*



Another source of AA quality products

To meet your "quick" or "long term" requirements for a variety of chemicals, depend on the A.A.C. Co. You can count on uniform quality and guaranteed purity through rigid laboratory control. You'll get expert assistance from skilled research people in developing "specials" for unusual projects. And you can count on prompt service.

CHOOSE FROM THESE AA QUALITY[®] PRODUCTS FOR FARM AND INDUSTRY

Florida Phosphate Rock • Superphosphate • AA QUALITY Ground Phosphate Rock
All grades of Complete Fertilizers • Gelatin
Bone Products • Fluosilicates • Ammonium Carbonate • Sulphuric Acid
Phosphoric Acid and Phosphates
Phosphorus and Compounds of Phosphorus

THE American Agricultural Chemical Co.

GENERAL OFFICES: 30 CHURCH STREET, NEW YORK 7, N. Y.

OTHER A.A.C. CO. SALES AND SERVICE POINTS

Alexandria, Virginia
Baltimore, Maryland
Buffalo, New York
Cairo, Ohio
Carteret, New Jersey
Charleston, South Carolina
Cincinnati, Ohio
Cleveland, Ohio
Columbia, South Carolina
Detroit, Michigan
E. St. Louis, Illinois
Fulton, Illinois
Greensboro, North Carolina
Henderson, North Carolina
Humboldt, Iowa
Havana, Cuba
Montgomery, Alabama
Norfolk, Virginia
No. Weymouth, Massachusetts
Pensacola, Florida
Pierce, Florida
Saginaw, Michigan
Savannah, Georgia
Spartanburg, South Carolina
Three Rivers, New York
Washington Court House, Ohio

Agricultural Chemicals Ltd.
Fort Chambly, Quebec
London, Ontario
Port Hope, Ontario



THE American Potash Institute has just issued a twelve-page bulletin, on the "American Potash Institute and How it Serves the Fertilizer Industry." The API statement reviews its fertilizer marketing and educational program. It would seem to have particular significance, coming as it does upon the heels of the recent resignation of six potash producing companies from NPFI because of a proposed increase in dues to cover the cost of an expanded program of research and publicity. (*Agricultural Chemicals*, July, pp34-39). The six potash companies* said the new fertilizer marketing program of the NPFI (adopted by NPFI members in June, 1957) overlaps a program they have been supporting for the past twenty years, through the American Potash Institute, and the increased dues proposed by NPFI would be inequitable.**

Some of the American Potash Institute activities are reviewed briefly below:

Personal Services to the Fertilizer Industry . . . members of API staff serve as officers, on committees, in consultation with state or regional fertilizer organizations.

Informational Services . . . publish "Better Crops with Plant Food," a monthly magazine sent to 25,000 fertilizer mixers, manufacturers, county agents, agricultural advisory groups, experiment stations, etc. Circulate (on request) reprints of articles to the various groups receiving the magazine.

News Letters . . . timely soil fertility information, usually featuring recent subject matter from the agricultural experiment stations and colleges in a given area, is prepared periodically, and sent to the 25,000 circulation recipients of API.

Wall Charts . . . the Institute has developed several wall charts or

AMERICAN POTASH INSTITUTE

— a review of its programs purposes and organization

posters dealing with such topics as nutrient deficiencies and plant food, and sent them to fertilizer producers, dealers, agricultural classrooms, county agents.

Books . . . two books have been published, dealing with nutrient deficiency symptoms and the various diagnostic techniques used in assessing fertilizer needs.

Movies . . . the American Potash Institute has a continuing program of motion picture production. Movies currently available deal with: soil testing, nutrient deficiency symptoms; plant tissue tests; leaf analysis . . . all relating to means by which the fertility requirements of the soil may be determined. The movies are made available to fertilizer companies and dealers for use in meetings they organize.

Slide Sets . . . the Institute has developed several kodachrome slide sets along with appropriate narratives. These are in wide use by agricultural teachers, fertilizer companies, county agents, etc.

Abstracts . . . a recent service is the publication and distribution of abstracts of articles dealing with the aspects of soil fertility.

Research . . . thus far, the Institute has supported research projects in some 40 different states and provinces.

Demonstrations . . . projects of a

more practical nature, frequently in the form of demonstrations, comparing different fertilizer practices, are conducted in cooperation with agricultural extension services.

Advertising . . . a balanced fertilization program is stressed in the potash advertising by the Institute in the farm press.

Other Activities . . . sponsoring of 4-H, F.F.A. or farm youth programs; preparation of articles for the farm and trade press; exploring new areas for expanding the fertilizer market.

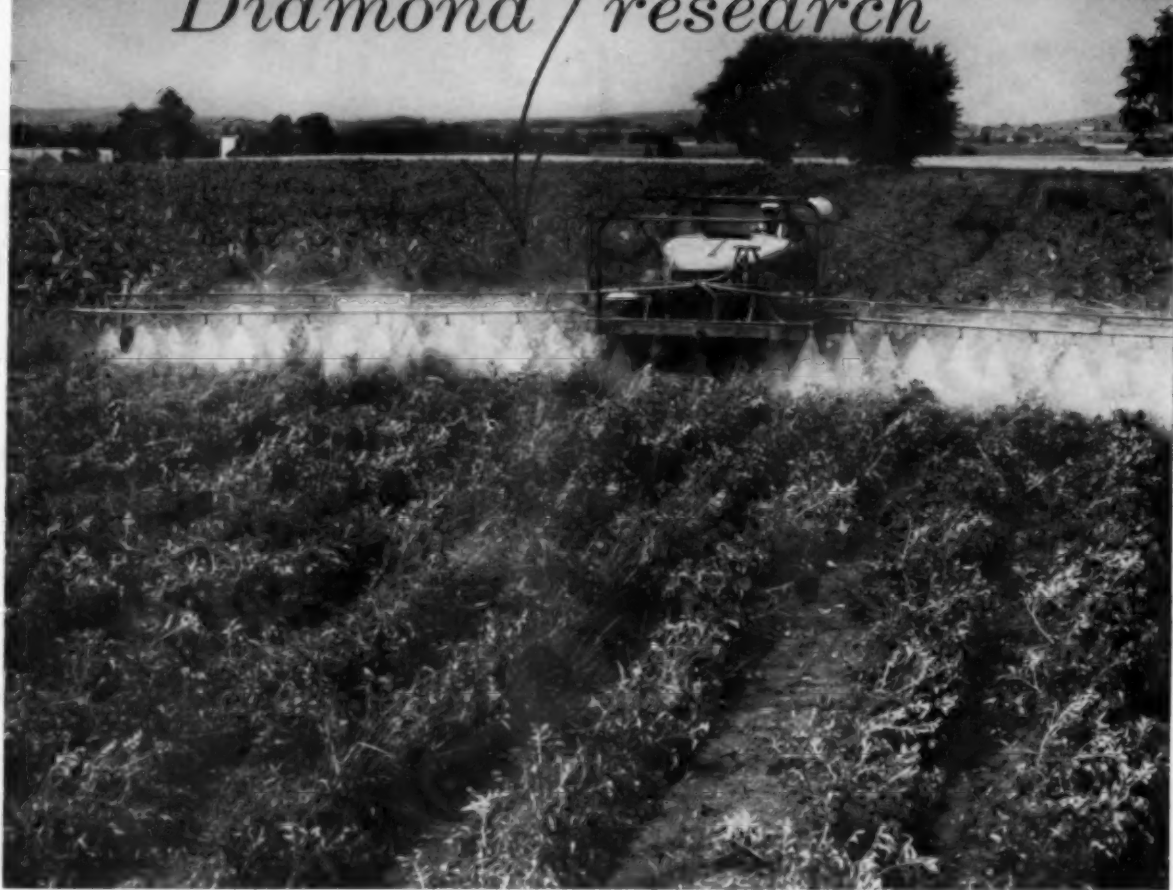
Organization . . . the API staff includes 15 agronomists, 2 editors and 2 librarians. Informational and library services are centered in Washington, D. C. Activities are divided into five territories, each under the supervision of a regional manager: Atlanta, Ga.; Lafayette, Ind.; San Jose, California, Washington, D. C.; and Burlington, Ontario, Canada. In some of the territories there are field agronomists under the direction of the territorial manager.

In summary, the API states that it has always cooperated very closely with the fertilizer industry, agricultural colleges, experiment stations, and other official agricultural agencies. Its activities are directed toward programs of balanced fertilization and soil management practices rather than to the direct promotion of the products of the industry.★★

*American Potash and Chemical Corp.; Potash Co. of America; Duval Sulphur and Potash Co.; National Potash Co.; Southwest Potash Corp. and U. S. Potash Division of U. S. Borax and Chemical Corp. These companies constitute the American Potash Institute.

**To finance the first step in its new marketing program, the NPFI board at the recent convention authorized an increase in dues from 1/20 of 1.0% to 3/20 of 1.0% of net sales. The new maximum dues rate of NPFI was set at 1/5 of 1.0%. (*Agricultural Chemicals*, July, 1957, p. 35.)

Proving ground for *Diamond research*



Every year thousands of farmers—and their healthy crops—prove the reliability of DIAMOND agricultural chemicals. This dependable performance is guaranteed by DIAMOND's thorough, imaginative research. If you're looking for development co-operation, consult our experienced technical staff. Just write DIAMOND ALKALI COMPANY, 300 Union Commerce Bldg., Cleveland 14, O.



DIAMOND INSECTICIDES AND HERBICIDES

- DDT
- BHC
- Lindane
- Grain Fumigants
- Miticide K 101 (Ovex)
- 2,4-D Weed Killers
- 2,4,5-T Brush Killers
- Hexachlorobenzene
- Wettable powders, dust concentrates, emulsifiable concentrates and oil solutions based on our technical grade chemicals.

L. S. Jones Succeeds L. Gentner as Chairman, Pacific ESA; L. M. Smith is Chairman-Elect

Louis Gentner (left) retiring chairman of the Pacific Branch of ESA, passes gavel to L. S. Jones, successor.



ENTOMOLOGISTS from the eleven western states, Canada and Hawaii discussed new pest control chemicals at the 41st annual meeting of the Pacific Branch, Entomological Society of America in Portland, Oregon, late in June.

Among the newer chemicals reviewed was Sevin (formerly known as 7744) which introduces a novel structure in insecticides. It contains no sulfur, phosphate, or chlorinated groupings reported Robert E. McKenzie, Carbide & Carbon Chemicals Co. Sevin (N-methyl-1-naphthyl-carbamate) is effective against DDT-resistant codling moths, and in field tests shows promise against grape leafhopper and citrus red scale. It will rank with the safer insecticides.

Economic species of mites increase in numbers as one progresses north, Dr. Harold F. Madsen of the department of entomology and parasitology, University of California, Berkeley, moderator of a panel on spider mites of tree fruits, declared in summarizing panel reports. Three species are of economic importance in California; four in Oregon and Washington, and five in Canada.

It was observed that the resistance of mites to various acaricides is widespread, and the problem is becoming more acute. Greenhouse operators, particularly those raising roses in southern California, are among the ones most affected by increasing mite resistance, according to

R. N. Jefferson, Univ. of California. While little work has been done on biological control, development of effective pathogens rather than predators appears most hopeful in his opinion. Poor application of acaricides and failure to apply them often enough probably is to blame for some development of resistance, he added.

Pest control materials manufactured in the United States are best known and most widely used of all those available to foreign countries, Roy Hansberry of Modesto, representing the Shell Development Company, told the entomologists. Export of pesticides has increased 16-fold in the past 18 years, amounting to \$79,000,000 in 1955.

Foreign restrictions placed on U. S. products reaching their shores sometimes attain fantastic proportions. Bolivia, for example, has six successive taxes piled up on imports after an import license has been obtained from the Central Bank of Bolivia.

Discovering the carrier of virus diseases of fruit trees is an extremely complex matter, according to S. Jones, USDA, Riverside, who was named chairman of the Pacific Branch ESA at the meeting. In an invitational paper entitled "A Review of Fruit Tree Virus Vector Studies," he outlined some of the problems.

In discussing organic phosphorus compounds, A. W. Cressman, Whittier, Calif., stated that the effectiveness of materials with very low vapor pressure varies with formulation. Dilute solutions in kerosene are more effective than 25% emulsifiable concentrates, which in turn are superior to wettable powders. Effectiveness of the kerosene solution, he said, is prob-

ably the result of the ability of the kerosene to penetrate the scale covering, carrying the organic phosphorus compound with it.

Chlorobenzilate, demeton, Kelthane, Aramite, Sulphenone, wettable sulfur, Trithion, Thimet, and AC-528 all gave good control for one month of the plum nursery mite in tests made during 1956, according to W. Anthon, Washington State College Tree Fruit Experiment Station. Chlorobenzilate, Kelthane, Aramite, and Sulphenone, applied to cherries five weeks before harvest, left no visible residue. Aerial dust applications of 4% Aramite plus 1% TEPP also gave good control, but TEPP dust alone was erratic.

Culex tarsalis Coq. has developed very high resistance to DDT in Oregon, three United States Department of agriculture entomology research workers stationed at Corvallis, Oregon, declared in a joint paper. The investigators are Gains W. Eddy, Theodore L. Hopkins, and William E. Robbins.

Granular insecticides are the least hazardous from the operator's point of view, W. M. Upholt, U. S. Public Health Service, Wenatchee, pointed out. Inhalation is the most toxic route the poison can follow. It is almost as hazardous as by direct injection. Particle size is directly related to the hazard. Because the average person has a reasonably good sense of smell he is able to detect the odor of most chemicals in such small quantities that they present no danger in that amount.

In agricultural use, the greatest hazard in using pesticides is in absorption through the skin. This dan-

(Continued on Page 92)



Leslie M. Smith
Chairman-Elect

Ready for your orders...



TREBO-PHOS
Trademark

American Cyanamid Company's
new Triple Superphosphate.

The latest manufacturing
techniques have been designed
into our Brewster, Florida
plant... to bring you constantly
uniform, high grade Triple.
We're ready to ship *when* you
need it... *as* you need it!

Write, wire or phone for full
information. American Cyanamid
Company, Phosphates Department,
30 Rockefeller Plaza,
New York 20, N. Y.
... or Brewster, Florida.



FUNGICIDE TESTS

(Conclusion)

Soil Treatments

Wheat

BUNT OR COMMON SMUT

A comprehensive screening test of the following materials for control of seed borne bunt was done in both Idaho and Oregon by Purdy on a winter and spring wheat, the results of which are of interest to many manufacturers and pathologists alike. (Table 91.)

Wheat

BUNT, SOIL-BORNE

In another series of tests against soil-borne common smut, made by Purdy in the five Pacific Northwest states, four fungicides received first preference and five are recommended. (Table 92.)

Cotton

ANTHRACNOSE

In a cooperative seed treating experiment carried out by 10 men in 10 southern states with 15 materials applied as liquids or as dusts to both reginned and to delinted cotton seed, var. Coker-100 WR, some significant conclusions were recently obtained altho tables were received too late for inclusion. According to Dr. C. H. Arndt, coordinator of the fine work, the better materials were Ceresan 200 and Captan. The former will be recommended at not less than 2 oz. per 100 lbs. of seed. Captan at 3 to 4 oz. per 100 will be recommended for treatment of fuzzy and reginned seed as a dust but not as a slurry. In these tests the reginned seed was thoroly infested with the anthracnose fungus. The materials under comparison included Agrox, Ceresan M-2X, Ceresan S, Panogen, Phenyl mercury acetate, Puraseed, Captan 75, Dow 9B, Memasol, Panogen 323, Pittsburgh Coke & Chem. C-272, Trichloromethyl-p-Toluene thiosulfonate, Trichloromethyl-p-chlorobenzene thiosulfonate, B856, and a methyl mercury hydroxide. Puraseed and B856 were generally less effective than the better fungicides. All were not used in all 10 states and some were employed at 2 or 3 concentrations. (47.)

Peanuts

SEEDLING ROT

In a comparison of four seed treatments at different rates, by Lyle and Brogden, at Headland, Alabama, all proved satisfactory and safe. First choice and the one recommended was 2% Ceresan, at two ounces per one hundred pounds. (Table 93.)

Corn

SEED ROT

In treatments at Wisconsin, Hoppe found captan, Thiram, Cerenox and a Pittsburgh Coke and Chemical Company No. 1843 were all superior to Dithane, or two University of Wisconsin antibiotics, Oligomycin and B74, in both cold tests and field tests. Captan and Thiram are recommended. (60.)

Ornamentals

Chrysanthemum

FOLIAR NEMATODE

In a series of weekly sprays made at Ithaca, New York to field plots of *C. morifolium* between July 10 and September 12, Dimock and co-workers found Chlorothion gave good control of leaf nemas without plant injury. A very similar compound with merely a different position of the chlorine atom on the ring was ineffectual, (Am. Cyan. 4124). Malathion was phytotoxic. Parathion, which is currently recommended was effective but not as safe to handle as Chlorothion. (Table 94.)

Lily

BULB ROT (FUSARIUM)

In replicated field plots in Maryland, McClellan and Smith compared five fungicides as bulb dips up to five minutes and found best yields came from a five minute dip in captan + Lindane (Ortho Seed Guard) two ounces per gallon with next best from captan alone. (Table 95.)

Roses

BLACK SPOT

Five fungicides each applied as a dust and as a spray, controlled black spot equally well when applied weekly to two varieties with suitable insecticides and miticides in field plots at Beltsville according to McClellan, Taylor and Smith. The first three choices of materials were maneb, zineb, and ferbam. Yields were in the same order. Only a mixture of copper and sulfur as a dust caused phototoxic symptoms and is not worthy of further trial. The three better fungicides are recommended to growers. (Table 96.)

Reports from Beltsville, Md.

In another test of six fungicides by McClellan, Smith and Taylor at Beltsville, the best control of black spot was obtained with two mercurials, Metasan and Phix, but these caused severe yellowing particularly of the variety Golden Mastermin. Red Radiance was more tolerant. The second best control was with Pyridinethione which warrants further testing. Santomerse, DDT and Lindane were in all sprays and certain miticides in some. (Table 97.)

CERCOSPORA LEAF SPOT

Maneb spray gave the best control and yield in replicated field plots where four sprays and dusts were compared in weekly applications by Lyle in Texas. Second choice was a sulfur-copper dust but it burned some in hot weather. Captan dusts, 4% and 7.5% gave unsatisfactory control but captan spray was third choice and is recommended with the first two for grower use. (Table 98.)

BLACK SPOT

In Ontario, seventeen weekly applications of seven fungicides were sprayed on field plots by Kemp between the first of June and late September. Satisfactory control was obtained with all but Captan 50W and CC9116. None was phytotoxic under 1956 cool conditions—though Pom-

ogreen has been in the past. First choice was a Captan Analogue No. 877 and second was Thioneb but Captan 50W and Pomogreen are being recommended. (Table 99.)

Some Highlights of the 1956 Tests

THE high rating given American Cyanamid's Company's No. 5223 for apple scab control in Illinois, Ohio, Pennsylvania, and North Carolina in a season when this disease was prevalent is of considerable interest. In Illinois it was considered both a protectant and eradicant. It gave mildew control comparable to Phylam and Mike sulfur. In North Carolina, on three year old trees, it caused slight purplish flecks on young leaves; it also gave better than average rust control.

The continued good control of the powdery mildews by the dinitro octile phenyl crotonates (Karathane, Mildex) on apple, and raspberry, and cucumbers in Florida are attracting interest, particularly on sulfur sensitive crops or in places where sulfur is apt to cause injury from high temperatures, because with the increase in the use of organics in place of sulfur on apples in the East mildew on certain varieties of apples is on the increase.

In Pennsylvania, zineb had longer residual effect against sooty blotch and fly speck on apple fruits than captan after spraying had stopped.

The uses and limitations for the antibiotics are becoming more clearly defined as much work is being done with them. Good results in New York with Streptomycin against fire blight were found to depend upon the temperatures during the infection period. To get best control it must be up to 65°-70° F. On vegetable diseases, lack of residual power points up the need of applications oftener than once a week. Streptomycin controlled bacterial spot of pepper in Florida and Tennessee and gave good control of potato seed piece decay in South Carolina and Delaware. Control of fungus diseases with antibiotics has not been spectacular but in greenhouse tests at Beltsville, Anisomycin and Griseofulvin controlled bean powdery mildew and rust. Oligomycin held down anthracnose, and Streptomycin controlled downy mildew. In Florida, also, Streptomycin controlled blue mold in tobacco seedbeds.

In Florida, leaf blight of corn smut was held down by nabam and maneb if applied twice a week.

Soil fumigants were tested in many states. Special uses are being found for Vapam and dichlorobromopropane (Nemagon), as for tobacco black root rot in Georgia and peanuts in Alabama. Methyl bromide was the outstanding material for tobacco seedbed treatments in North Carolina, where surveys have shown the presence of five parasite nematodes—often in quantities as high as the root knot nema. Vapam, 100 gallons, was as effective as 300 pounds of methyl bromide against black root rot of tobacco in Georgia. Chloropicrin at 35 gallons gave satisfactory control of verticillium wilt of cotton in New Mexico, being better than

(Continued on Page 99)

(Tables 84-99 appear on p. 50-51.)

TABLE 86
Dusts for Downy Mildew Control in Tobacco Plant Beds in Florida (13).

Fungicides	Control Rating	Pl. Safety Rating	Yield Rating	Exper. Pref.
Dithane Z78 6.5%	3	1	2	1
Parzate 6.5%	2	2	1	1
Dithane M22 7.0%	1	3 T	3	3
Manzate 7.0%	1	3 T	3	3
Dithane M22 3.5%	2	2	1	2

TABLE 88
Control of Blue Mold of Tobacco in South Carolina (50).

Fungicide	Lbs./100 g	Appli./wk.	Control Order
zineb	3 lbs.	2	1 S
"	"	1	3 S
"	2 lbs.	2	1 S
"	"	1	4 U
"	1 lb.	2	3 S
"	"	1	4 U
ferbam	4 lbs.	2	2 S
"	"	1	6 U
"	3 lbs.	2	2 S
"	"	1	6 U
"	2 lbs.	2	5 U
"	"	1	6 U
Streptomycin sulfate	300 ppm	2	2 S
"	"	1	5 U
"	200 ppm	2	2 S
"	"	1	7 U
"	100 ppm	2	4 U
"	"	1	7 U
Streptomycin sulfate + 1% glycerine	200 ppm + gly.	2	3 S
"	"	1	7 U
"	100 ppm + gly.	2	3 S
"	"	1	7 U
"	50 ppm + gly.	2	4 U
"	"	1	7 S

TABLE 89
Control of Cercospora Leafspot of Tobacco in Philippine Seedbeds (60)

Treatment	Mean No. spots—300 Plants After 6 Appl. to 6 Replications
Check	721
Fermate 1½ lbs.	93
Orthocide 2 "	81
3-3-50	41
Manzate 2 "	17

TABLE 90
Control of Cercospora Leafspot of Tobacco in the Philippines with 6 Weekly Appl. to Seedbeds (68).

Treatment	Mean No. spots—300 Plants in 6 Replications
Check	511
Zerlate 2 lbs.	196
Copper A Comp. 3 "	163
3-3-50	114
Dithane Z78 2 "	12

TABLE 92
Soil-borne bunt control in Pacific Northwest (16).

Material	Rate per bushel	Exp. Pref.	Recomm.
Anticarie	1 ounce	1	X
Sanocide	1 ounce	1	X
No Bunt	1 ounce	1	X
Smut Go	1 ounce	1	X
Terrachlor	1 ounce	2	
Panogen	¾ ounce	3	X
Vehicol Emmi	½ ounce	3	
Other mercurials		3	

TABLE 93
Seed Treatments For Peanuts In Order Of Experimenters' Preference in Alabama (1).

Material	Oz./100 Lbs. of seed	Exper. Pref.
Ceresan 2%	2	1
Ceresan 2%	4	2
Arasan	2	3
Metasan M	2	4
Delsan A-D	3	5
Metasan E	1	6
Arasan 75	2	7
Thiram	2	8
Arasan 75	3	9
Delsan A-D	3	10

TABLE 94
Foliar Nematode Control in New York (33).

Nematicide	Rate/100 g.	Control Rating	Ex. Pref.
Parathion	1.5 lb.	1	2
Malathion	2.0 gal.	1	
Chlorothion	.75 to 2.25 pts.	1	1
Am. Cyan. 4124	1 to 3 pints	U	

TABLE 95
Lily Bulb Treatment For Fusarium Rot in Maryland (21).

Materials and rate	Order of Yield Bulb Weight
captan + Lindane (Ortho) 2 oz./gal-5 mins.	1
captan 2 oz./gal-5 mins.	2
Dowicide A 5%-5 mins.	3
Check	4
Parzate dust undiluted	4
Arasan dust "	5

TABLE 96
Control of Black Spot Of Roses At Beltsville, Maryland (21).

Fungicide	Rate	Yield Rating	Exper. Pref.
ferbam	2 lbs. spray	3	3
"	7.6% dust	3	3
zineb	2 lbs. spray	2	2
"	6.0% dust	2	2
maneb	2 lbs. spray	1	1
"	7.0% dust	1	1
captan	2 lbs. spray	4	
"	10.0% dust	4	
Copper-sulfur	3.4% copper + 25% sulfur dust	4	
None	None	5	

TABLE 97
Black Spot Of Rose Control, At Beltsville (21).

Fungicide	Rate Per 100 gals	Control Rating
Metasan OP	4 oz.	1
Pyridinethione—Fe salt	2 lbs.	2
Pdno—dench	187.5 ml.	3
Phix	4 oz.	1
Carbide & Carbon 9116	2 lbs.	3
Oligomycin	100 ppm	3

TABLE 99
Control of Black Spot of Roses in Ontario (62)

Fungicide	Lbs./Imp. Gal.	Exp. Pref.
Thioneb	2 lbs.	2
Captan 50 WP	2 lbs.	5
CC9116	2 lbs.	6
Pomogreen	4 lbs.	3
Vancide A	2 lbs.	4
Captan 877	2 lbs.	1

TABLE 91

Percent Smut In Treatment Tests For The Control Of Seed-Borne Common Smut In Orin Winter Wheat, and Red Bobs Spring Wheat At Pendleton, Oregon, and Moscow, Idaho. (43).

Treatment	Form Oz./bu.	Spring %Smut P. M.	Wheat Stand P. M.	Wheat %Smut P. M.
Check—uninoculated		T T	67 78	2 1
Check—inoculated		93 66	74 70	92 90
Mema	Liq. 1/4	0 T	60 81	13 4
Mema	Liq. 1/2	T 0	63 82	3 0
Mema-sol	W.P. 1/8	2 4	70 77	10 3
Mema-sol	W.P. 1/4	T 1	— 76	5 0
Mergamma	W.P. 13/4	0 1	62 69	22 7
Mergamma	W.P. 2 1/2	0 0	42 75	16 2
No Bunt	W.P. 1/2	2 8	73 64	12 10
No Bunt	W.P. 1	0 1	74 75	2 1
Chipman 80% HCB	W.P. 1/4	2 29	— 66	15 7
Chipman 80% HCB	W.P. 1/2	2 8	65 72	4 7
Agrox	W.P. 1/2	34 51	59 68	83 70
Agrox	W.P. 1	— —	— —	85 52
Stauffer Heptachlor— PMA	Liq. 4 1/2	1 3	73 76	30 22
Mer-sol	Liq. 1/2	3 1	62 76	12 8
Mer-kote	W.P. 1/2	3 T	72 87	21 11
Mer-lin 1-37	Liq. 2	2 4	70 87	9 4
Mer-lin 1-37	W.P. 2 3/4	0 0	54 68	2 0
Velsicol Emmi	Liq. 1/2	0 0	82 80	2 T
Velsicol Emmi	W.P. 1/2	0 T	63 82	3 4
Setrete	Liq. 1/2	1 1	72 75	9 4
Panogen 15	Liq. 3/4	0 0	60 77	10 T
Panogen 15 + A-201	Liq. 3/4, 2 3/4	T T	72 72	— —
Panogen 15 + H-203	Liq. 3/4, 2 1/4	1 1	58 76	— —
A-201	Liq. 2 3/4	90 48	61 70	— —
H-203	Liq. 2 1/4	86 52	55 66	— —
Panogen 42	Liq. .2	0 0	60 81	7 T
Panodrin (1954)	Liq. 4	21 10	— 81	88 58
Panodrin (1955)	Liq. 3	12 8	— 77	— —
Panodrin (1955)	Liq. 4	4 5	54 78	75 60
Mercurine 100	Liq. 1/2	1 T	75 75	4 2
Metasol E	Liq. 3/4	1 0	71 83	5 1
Metasol M	Liq. 3/4	0 T	64 79	5 1
Metasan E	W.P. 1/2	T 0	71 88	5 0
Metasan M	W.P. 1/2	0 0	63 73	3 1
Liquid Mercury 244	Liq. 3/4	0 0	63 75	7 1
Liquid Mercury 365	Liq. 1/2	1 0	70 77	1 1
Ceresan D	Liq. 3/4	T 0	66 82	4 1
Ceresan S	Liq. 1/4	T 0	62 81	2 0
Ceresan M	W.P. 1/2	T 0	75 80	11 2
Ceresan M-2X	W.P. 1/4	0 0	64 78	5 1
duPont Mercury + Aldrin	Liq. 4	— 4	— 81	— —
Penn. Salt Hept. + PMA	Liq. 4	0 0	67 74	5 2
Gallotox	Liq. 1/2	1 1	79 77	— —
Puraseed (1955)	W.P. 1/2	1 3	— 75	28 31
Puraseed (1956)	W.P. 1/2	T 1	66 75	— —
C13-125	W.P. 1/2	2 5	— 76	22 6
Phillips F-824	Liq. 1	1 11	— 67	— —
Phillips F-54	Liq. 1	84 35	— 66	— —
RE-3681	Liq. 2 1/4	— —	— —	25 7
RE-3681	Liq. 4 1/2	0 3	67 80	3 2
RE-3682	Liq. 2 1/4	— —	— —	6 2
RE-3682	Liq. 4 1/2	0 1	49 69	1 1
OR-232	Liq. 4 1/2	1 5	72 75	19 3
Smut B Gon	Liq. 1/2	0 1	64 86	12 3
OR-302	W.P. 1/2	1 8	— —	11 2
OR-302	W.P. 1	0 T	64 79	8 2
Sanocide	W.P. 1/2	5 35	65 75	12 6
Sanocide	W.P. 1	0 4	58 69	1 2
RE-10	W.P. 1/2	22 7	— 69	— —
RE-10	W.P. 1	8 6	76 74	— —
RE-4355	Liq. 1/2	68 46	— 70	— —
RE-4355	Liq. 1	88 37	— 70	— —
RE-4355 + Orthocide 75	Liq. 1, 3/4	57 56	— 75	— —

TABLE 91 (Continued)

Treatment	Form Oz./bu.	Spring %Smut P. M.	Wheat Stand P. M.	Winter Wheat %Smut P. M.
RE-4371	Liq. 1/2	90 23	— 69	— —
RE-4371	Liq. 1	65 18	— 61	— —
RE-4371 + Orthocide 75	Liq. 1, 3/4	22 13	— 65	— —
RE-4274 (OR-422)	W.P. 1/2	71 24	— 81	— —
RE-4274	W.P. 1	34 19	— 66	— —
RE-4274 + Orthocide 75	W.P. 1, 3/4	15 6	— 72	— —
RE-4207 (OR-298)	W.P. 1/2	73 40	— 72	— —
RE-4207	W.P. 1	20 27	— 75	71 29
RE-4207 + Orthocide 75	W.P. 1, 3/4	5 12	— 70	— —
RE-4297 (OR-432)	W.P. 1/2	81 45	— 62	— —
RE-4297	W.P. 1	52 21	— 49	— —
RE-4297 + Orthocide 75	W.P. 1, 3/4	52 37	— 65	— —
RE-4344 (OR-492)	W.P. 1/2	60 34	— 78	— —
RE-4344	W.P. 1	49 23	— 74	— —
OR-301	W.P. 1/4	6 34	— 76	14 4
OR-301	W.P. 1/2	1 4	59 64	2 4
OR-303	W.P. 3/4	— —	— —	11 12
OR-303	W.P. 1/2	T 9	— 70	6 2
OR-303	W.P. 3/4	— —	— —	2 2
OR-303	W.P. 1	T T	64 69	— —
RE-4215 (OR-299)	W.P. 1	— —	— —	81 55
RE-4059 (OR-277)	W.P. 1	— —	— —	87 90
RE-4075 (OR-300)	W.P. 1	— —	— —	88 65
RE-4087 (OR-170)	W.P. 2	— —	— —	81 42
RE-3737	W.P. 1/2	— —	— —	55 17
RE-3737	W.P. 1	— —	— —	19 5
OR-127	W.P. 2	— —	— —	28 9
Tag No. 331	Liq. 1/2	— —	— —	2 0
Dow HCB M-476	W.P. 1/2	1 19	63 64	12 11
Dow HCB M-476	W.P. 1	1 1	65 63	2 2
M-501	W.P. 1/2	1 15	— 67	14 10
M-501	W.P. 1	1 3	— 65	2 2
M-505	W.P. 1/2	1 12	— 66	9 4
M-505	W.P. 1	T 1	— 62	T 2
M-506	W.P. 1/2	6 26	— 66	9 11
M-506	W.P. 1	T 4	— 80	1 4
M-507	W.P. 1/2	1 13	— 68	11 2
M-507	W.P. 1	T 2	— 66	0 3
M-508	W.P. 1/2	1 30	— 68	7 4
M-508	W.P. 1	1 3	— 67	0 3
M-509	W.P. 1/2	2 13	— 65	11 7
M-509	W.P. 1	1 3	— 67	2 2
M-510	W.P. 1/2	2 15	— 67	8 5
M-510	W.P. 1	0 T	— 70	T T
Anticarie	W.P. 1/2	T 6	71 66	3 4
Anticarie	W.P. 1	1 2	69 59	3 3
Smut Go	W.P. 1/2	2 23	64 60	4 3
Smut Go	W.P. 1	T 2	78 67	0 1
Heptachlor + HCB	W.P. 2	T 1	72 72	6 1
Hexadane	W.P. 2	1 11	51 63	35 8
B-1843	W.P. 1/2	26 9	— 78	92 48
B-1843	W.P. 1	10 6	— 84	88 37
Y-2865 HCE + 1254	W.P. 2	76 44	— 67	96 80
Y-2866 HCE + 5460	W.P. 2	96 51	— 79	93 82
Y-2867 HCE	W.P. 2	92 41	— 71	92 92
Terraclor	W.P. 1/2	— —	— —	21 2
Terraclor	W.P. 1	0 22	64 68	4 1
Gytrete	Liq. 1/2	— —	— —	5 1
8599	W.P. 1	— 61	— 75	— —
14307	W.P. 1	— 68	— 73	— —
Ceresan M + A-201	W.P. 1/2, 2 1/4	1 T	— 78	— —
Ceresan M + H-203	W.P. 1/2, 2 3/4	0 0	— 80	— —
Anticarie + A-201	W.P. 1/2, 2 1/4	0 10	65 62	— —
Anticarie + H-203	W.P. 1/2, 2 3/4	0 12	69 72	— —
Anticarie + Ceresan M	W.P. 1, 1/2	0 0	69 84	— —
Anticarie + Panogen 15	W.P. 1, 3/4	0 1	73 78	— —
Anticarie + Mema	W.P. 1, 1/4	0 0	68 80	— —
Anticarie + Velsicol Emmi	W.P. 1, 1/2	0 0	67 78	— —

*P= Pendleton, M= Moscow.

16.2 11.8

BIG DAVE SAYS,



DAVISON
GTS*

now guarantees
you a
46% A.P.A.
minimum!

* Granulated Triple Superphosphate

HIGH IN P_2O_5 CONTENT—Because it is constant in analysis its guaranteed minimum is 46% A.P.A.
UNEXCELLED QUALITY—Because of Davison's more than century of experience in fertilizer formulation DAVISON Granulated Triple Superphosphate is the standard by which all other granulated products are compared. It is guaranteed to satisfy you on every count.

EASY TO HANDLE—Because of its uniform particle size it spreads evenly and uniformly and is perfect for direct applications. Does not deteriorate in handling, packaging or storage.

IDEAL FOR FORMULATIONS—Because it is easy to blend. Excellent for alkaline goods and especially recommended for O-25-25.

"TRIPLE" IN SERVICE AND DELIVERY TOO—You get DAVISON GTS *when* you want it, *where* you want it, the *way* you want it.

Progress **D** Chemistry

DAVISON CHEMICAL COMPANY

Division of W. R. Grace & Co.
Baltimore 3, Maryland



Producers of: Catalysts, Inorganic Acids, Superphosphates, Triple Superphosphates, Phosphate Rock, Silica Gels, Silicofluorides, Rare Earths and Thorium. Sole Producers of DAVCO® Granulated Fertilizers.

Fertilizer Views and News

Manures and Fertilizers

OF perennial interest is the debate regarding the relative merits of farmyard manure, or dung as our British colleagues prefer to call it, and chemical fertilizers in the profitable production of commercial crops. Some investigators have insisted that the fertilizers are to be considered as complementary to the dung; others, with field test data to support them, have stoutly maintained they could advantageously replace animal manures. The more moderate view has been that their uses are complementary. It is difficult to analyze the part farmyard manure plays in maintaining soil fertility and feeding crops on those farms which carry livestock, because it is so bound up with the whole system of farming. Furthermore, the number of good experiments to evaluate the different combinations of manure and fertilizers is limited.

Recent studies on this subject in Great Britain have stimulated our desire to refer briefly to this old, but never dull debate. As to the application of organic matter amendments, Rothamsted scientists believe that a review of the evidence shows such amendments are not essential for all types of soil; that in many of the comparative tests involving manures and inorganic fertilizers, the fertilizers were not used at optimum levels, thus creating a bias in favor of the virtues of the manure. They question whether in the presence of optimum amounts of fertilizers, the crop responses to manures would be significant. It is a well-known fact that the organic matter content of soils can be maintained satisfactorily by means of root and plant residues from arable crops, and from turned-

under fertilized cover crops. Seabrook Farms in New Jersey is an outstanding example of this successful practice. Some farmers are finding it profitable to sell all the manure they produce while depending on root and stover residues for their supply of organic matter.

Trace Elements In the Diet

WITH the ever increasing pressures of expanding populations in most countries of the world, man will be forced to find new methods of increasing not only the yield, but also the nutritional value of the crops he produces. Research in different fields of science is revealing the close interrelationship of soil, food and health in plants, animals and humans. This research is shedding a little light in what is still a dark region. The scientist working exclusively with plant life is unwittingly bringing out relationships which correspond with similar discoveries in the animal organism. Eventually, it will be clear to scientists that Nature is a vast oneness. Fundamentally, the very intimate life of a plant cell is no different from that of an animal cell.

These thoughts were aroused in me as I read a brief report of a paper by Dr. George A. Davis of the Florida Agricultural Experiment Station given at the recent meeting of the American Chemical Society. Dr. Davis, discussing nutrition, pointed out that we cannot think in terms of only single elements. The diet, he emphasized, requires a proper balance of many elements; a fact which producers and users of mill feeds and mineral supplements do not sufficiently recognize.

The assumption is often made that if we feed an animal more of a

particular element than it really needs, no harm will be done. Yet nutritionists, like Dr. Davis, have shown that an excess of a metal in the diet may interfere with the proper utilization of other essential elements, creating many new problems. For example, an excess of calcium will interfere with the body's use of zinc. If to correct this imbalance extra zinc is added to the diet, the body's ability to make use of copper may be impaired. Thus, the change in the proper level of an element in the diet can frequently change the need for or action of some related element. Dr. Davis explained also how molybdenum interferes with the formation of vitamin B12 in the body's metabolism, and the excessive ingestion of copper causes disappearance of zinc in the animal liver.

References have been made in this column to the interrelationship of soil magnesium, zinc, copper, boron, manganese, iron and molybdenum and the major elements, with the health and vigor of plants and animals which graze such plants. Lambs grow badly on soybean hay grown in phosphorus deficient soils, but respond well to a phosphorus supplement, and cattle are unthrifty grazing forage on low-cobalt soils in North Carolina, but thrive if fed mineral cobalt.

Excessive zinc in a soil shows up in crops having an excess amount of zinc, the extra zinc having got in the plants at the expense of copper. The effect on the animals fed such crops is harmful. Rats fed a copper deficient diet are unable to metabolize two important copper bearing enzymes, ascorbic acid oxydase (forerunner to vitamin C) and tyrosinase, needed by the body in using inhaled

Add a selling feature to your
insecticide with sift-proof

DUOTITE BAGS

You'll give your customers 100% value, your salesmen something to shout about when you pack your insecticide in Duotite bags. The exclusive Shellmar-Betner Duotite feature is a double-folded and heat-sealed bottom, which combined with liners, give positive assurance that your product won't sift. The top can be double-folded and heat-sealed, too; and there is reasonably-priced machinery available for this purpose. Add to sift-tightness the eye-appeal of clean, crisp color-printing by Shellmar-Betner craftsmen; and you have a package that will really build sales.

This is only one of many different packages that Shellmar-Betner now makes for chemical products. If you'd like better flexible packaging for your product, check with Shellmar-Betner.

SIFT-PROOF—

Specially lined and sealed. Duotite bags give double protection against sifting. Customers get full measure of quality.



CONTINENTAL © CAN COMPANY

SHELLMAR-BETNER

FLEXIBLE PACKAGING DIVISION

MT. VERNON, OHIO

Sales Offices in Principal Cities

oxygen. It is well known that excess molybdenum in the soil can cause an excessive uptake of this element by forage crops, and lead to toxic effects in the grazing animal.

The complete role of trace elements in the human body has not yet been discovered. The research here has lagged years behind research on animal and plant tissues. One deterrent to a more rapid progress has been the inability of investigators to get pure, human tissues from healthy deceased persons, and the lack of adequate methods of spectrochemical analysis and colorimetric techniques. These drawbacks are being overcome. In time we shall know more about the influence of such elements in the incidence of disease, and in the promotion of vital health in man. Undoubtedly, the quest for knowledge about these elements in human physiology will be aided by the large body of information accumulated by the investigators of nutritional problems of plants and animals. Team research is today's approach to baffling problems.

To return to the British data: the University of Manchester surveyed about two years ago 65 sugar beet farms in the Midlands. On those farms which applied manure, about £3 less per acre was spent for fertilizers, but their average yield per acre was 13 cwt. less than the average yield for the farms using fertilizers alone. Those farms which applied the manure had the cost of applying it as an extra expense, which amounted to £3 per acre higher than the cost of fertilizers alone. Thus, even when the value of the manure was set at 15 shillings per ton, the gross costs of applying the manure plus fertilizer were about £6 greater than the gross costs of applying the fertilizers alone.

This interesting report from Great Britain is of value to students in all countries. In our own country, the excellent research at Seabrook Farms, under the direction of Dr. Frank App, should be known to all commercial growers and agronomists, because it demonstrates what can be done on Coastal Plain soils to maintain an adequate supply of organic

matter with root residues and fertilized cover crops. It is the answer to the question, how maintain an adequate supply of organic matter without farm manure?

Seeds Get Hot Water or Shock Treatment

LATEST wrinkles in accelerating germination of hard coated cotton seeds or of corn seeds are hot water immersion and shock treatment with low frequency electrical energy.

Scientists at the University of California found that by dipping the hard seed of Pima S-1 cotton, an improved variety, in a hot water bath of 160°-185°F. for 45 to 90 seconds, the chemical compound which inhibits rapid germination could be dissolved or destroyed. Farmers in Arizona and California have now adopted this method and subject all Pima S-1 seed to the prescribed heat treatment. At a cost of about \$10 per ton of seed, they are able to use 40% less seed to assure a good stand. Under irrigation conditions, the slow or inhibited germination of untreated seed can mean a big loss to the grower through skimpy stands or delay in or non-uniformity of maturity. The plant breeders succeeded in greatly improving the cotton fiber, but apparently had not duly considered the effect of cross breeding on the hardness of the seed coat.

From the U.S. Department of Agriculture comes the story of shock treatment of seed to speed up or retard its germination. An electrical device invented by O. A. Brown and associates using a low frequency radiation induces changes in the seed. Strangely, the same fundamental idea was suggested some 200 years ago shortly after Benjamin Franklin's famous kite experiment. Soybeans, purple-top turnip seed and red clover seed were used in the test work along with corn seed. Exposed to the radiation for a brief period, seed germinated more quickly and more uniformly. The device may also be used to dry crop seeds and destroy the embryos of weed seeds.

An interesting side-line in this work deals with treatment of soy-

beans, which apparently are among the most difficult to prepare for human consumption. Irradiation of soybeans increased their water sorption capacity. A few minutes after being placed in water they swelled to twice their original size and within 30 minutes disintegrated. Research by competent operators is the solution for many farm problems. More, not less research is needed to sustain farm property.

Soil Testing Again

SOIL analysis as an aid to more efficient farming is making good progress in many countries of the world. If the soil test is calibrated in terms of fertilizer plot tests and crop responses, from which the analyst derives regression coefficients and uses such information to interpret the test and make the fertilizer recommendation, the farmer is getting substantial aid. Such procedure is the only satisfactory one that can be justified; otherwise, the test is meaningless. The results of sampling and analyzing the soil have to be "weighed" against crop response, and the limitations to interpretation must be recognized realistically. Merely purchasing a test kit, putting soil on a porcelain slab and adding a chemical to produce pretty shades of color is not the answer.

The experienced analyst knows that land varies from farm to farm and from one end of a field to another. The make-up of the soil depends chiefly on the composition of the mother rock from which it was formed by weathering, the nature of the vegetation grown upon it which determines its humus content, and the degree to which it has been subjected to cropping, leaching and wind erosion. The decomposition of soil organic matter releases acids which solubilize some parts of the rock fragments, making them food elements for plants. At present 16 nutrient elements are recognized as essential to plant life, 12 of which are furnished by the soil. Some few soils have all these elements, others are well supplied with some but poorly with others. The analyst can determine the degree of acidity of the

(Continued on Page 95)



three to
GROW
on:

TEXACO NITROGEN SOLUTIONS

TEXACO AQUA AMMONIA

TEXACO ANHYDROUS AMMONIA

... fertilizer material from Texaco's new midwest plant

From Texaco's new ammonia plant at Lockport, Illinois, will soon come a line of chemical raw materials to serve the growing Midwest fertilizer market: Texaco Nitrogen Solutions, Aqua Ammonia, and Anhydrous Ammonia ... each made to exacting specifications at one of the most modern plants of its kind in the country ... with rapid tank truck and tank car service from the heart of the farm belt.

With the start-up of the Lockport plant, Texaco will offer fertilizer manufacturers all the advantages of uniform product quality, a dependable, centrally located source of supply, and expert technical assistance.

Look to Texaco for chemicals to *grow* on.

The Texas Company, *Petrochemical Sales Division*, 135 East 42nd Street, New York 17, N. Y., 332 South Michigan Avenue, Chicago 4, Ill.



TEXACO

PETROCHEMICALS

LISTENING POST

By Paul Miller



This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Epidemics and Identification Section, Horticultural Crops Research Branch, United States Department of Agriculture, Beltsville, Maryland.

Tests for Control of Helminthosporium Diseases of Certain Grasses

HOUSTON B. Couch and Herbert Cole, Jr.* of the Pennsylvania Agricultural Experiment Station, report results of field tests with various chemicals for the control of melting-out of Kentucky bluegrass (*Poa pratensis*) and of Helminthosporium blight of Illahee fescue (*Festuca rubra*). The bluegrass disease is caused by *Helminthosporium vagans*; the fescue grass disease by *H. dictyoides*.

During the 1956 growing season both diseases were severe in Pennsylvania. "The prolongation of cool, wet weather was conducive to the development of the leaf spot phase of these diseases in epiphytotic proportions through the month of July. The balance of the summer was characterized by sporadic outbreaks in various sections of the state. At the peak of disease development, many stands of Kentucky bluegrass were either entirely killed, or rendered so undesirable it was necessary that they be re-established."

After discussing earlier work, the authors continue with the description of their own experiments.

Melting-out of Kentucky Bluegrass: "In the present investigation, Acti-dione (cycloheximide), Kromad (5% cadmium sebacate, 5% potassium chromate, 1% malachite green, 0.5% auramine, and 16% tetramethylthiuram disulfide), Omadine

(the disulfide derivative of 2-pyridinethione 1-oxide, 50%), Captan 50-W (50% N-(trichloromethylthio)-4-cyclohexene-1,2-dicarboxide), and Terramycin (oxytetracycline) were tested for control of melting out of Kentucky bluegrass.

"Each compound was tested at 2 rates on 2 dates of application for a total of 21 treatments randomized through 6 replications. Each plot measured 4 feet x 25 feet. Materials were applied under 35 pounds pressure, using a boom-type T-jet system, held 18 inches above the turf. All applications were made on the basis of dilution in 1.25 gallons of water per 1000 square feet. Triton B-1956 wetter and sticker was used with each treatment at 2 ounces per 50 gallons of water.

"The test area consisted of a third-year stand of Kentucky bluegrass. At the beginning of the investigation, the plants were heavily infected with *H. vagans* and disease incidence was uniform throughout the area.

"Disease incidence and severity ratings were made 12 days after the second date of fungicide application. Sampling of each plot for leaf infection readings was accomplished in the following manner. A 15-foot grid system of twine, providing 15-foot square sections arranged in a linear fashion, was stretched over the center of each plot in such a manner as to orient the long axis with that of the

area to be sampled. For each plot, 5 of the 1-foot sections were selected at random and 20 leaves taken from each. Using an infection scale reading from 1-5, based on percentage of leaf area covered by lesions, each 20-leaf sample was rated. The total 100-leaf rating for the plot was then computed by averaging the 5 samples.

"A further test of the efficiency of the compounds used was made by taking samples for yield comparisons simultaneously with the leaf spot collections. This was accomplished by collecting all of the clippings from a 16-inch swath cut with a hand lawn mower through the center, and for the full length, of each plot. Final readings on these samples were taken after they had been dried to a constant weight at 40° C. These results, as well as the leaf lesion ratings, were subjected to analysis of variance.

"With the exception of the lowest dosage and single application of Omadine, all of the materials tested gave a reduction in incidence of leaf lesions significant from the check at the 0.1 per cent level. In addition, highly significant increases in yields per plot were obtained with two applications of Omadine, Kromad, and Captan 50-W at 200 gm., 4 ounces, and 4 ounces respectively. The level of disease control afforded by these three treatments was readily apparent. These plots were considerably greener and the plants much taller than the checks as well as the other treated areas.

"Acti-dione, at 1200 mg. per 1000 square feet, brought about a significant reduction in growth of Kentucky bluegrass. This retardative influence lasted about 7 days. The chlorotic flecking of the lamina char-

* Houston B. Couch and Herbert Cole, Jr. Chemical control of melting-out of Kentucky bluegrass. *Plant Disease Reporter* 41: 205-208. Mar. 15, 1957.

acteristic of this material on the Merion variety of Kentucky bluegrass . . . was not observed."

Helminthosporium Blight of Illahee Fescue: "A similar trial was conducted simultaneously for control of *Helminthosporium* blight of Illahee fescue . . . In this series, Acti-dione, Kromad, and Captan 50-W were tested at the above-mentioned rates, while the disulfide form of Omadine was replaced with the 50% zinc salt of this material at 100 gm. and 200 gm. per 1000 square feet, and Terraclor (pentachloronitrobenzene, 75% wettable powder), at 2 ounces and 4 ounces per 1000 square feet, was substituted for Terramycin.

"Disease incidence ratings were made 12 days after the second date of fungicide application. Analysis of the readings did not reveal a significant decrease in incidence of leaf lesions nor increase in yield per plot for any of the materials tested. Terraclor, at 4 ounces per 1000 square feet, was extremely phytotoxic to Illahee fescue. The toxic effect of this compound, manifested as a slight retardation in growth followed by an overall withering of the leaves, was evident 5 to 7 days after treatment, with approximately 50 percent of the plants in the plots being killed."

Effect of Chemicals on the Fungi Growth in Culture: A study was made of the reaction of the two species of *Helminthosporium* to the fungicides used in the field trials. The organisms were grown on potato dextrose-yeast agar in 5 concentrations of each material. The basis for comparison was mean diameter growth of the fungi in the cultures. It was found that "*Helminthosporium vagans* was much more sensitive than *H. dictyoides* to the varying concentrations of Captan 50-W, while the latter species showed far less tolerance to Terraclor and the zinc salt of Omadine. No difference in response of the two species to the other fungicides was noted."

Discussion: "The primary economic aspect of the leaf lesion phase of melting out of Kentucky bluegrass is leaf abscission. Infection is generally heavier at the base of the leaf

sheath, and since one lesion located in this area can result in the loss of the entire leaf, the level of protection provided by a fungicide must be extremely high if economic control of the disease is to be realized. This is borne out by the fact that although most of the treatments gave highly significant reductions in lesion incidence, only Kromad, Captan, and Omadine, applied at 10-day intervals, reduced leaf abscission to the extent that it could be measured in increased yield per plot."

The writers feel that "in evaluating the level of chemical control of melting out of Kentucky bluegrass in

large scale field tests, the yield sampling technique" described by them "is much simpler and provided a more accurate picture of response to treatment than a leaf lesion incidence rating system, and can be used to the exclusion of the latter approach.

"It is felt that the negative results in control of *Heminthosporium* blight of Illahee fescue could have been due to the low amount of diluent used. This species is characterized by a rather heavy mat-type of growth, and it is possible that the materials were not placed in the critical areas, i.e. crowns and bases of leaf sheaths."

★★



This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Plant Pest Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the U. S.

By Kelvin Dorward

European Corn Borer Counts High in Several Areas

By the first of July the European corn borer situation was rather spotted. Missouri reported the highest numbers that had been recorded for several years. The situation was ideal for heavy second- and third-generation damage in the southeastern part of the state. The European corn borer has been of economic importance in Alabama only in recent years, but reports state that the insect was severe in corn in the northern part of the state by late June.

By the first of July, Illinois had egg mass counts of 100-400 per 100 plants in early fields. Maximum egg counts in the Perry, Iowa area were 500-700 per 100 plants. Light to moderate populations were reported from Pennsylvania, Ohio, Indiana, Wisconsin, Minnesota and South Dakota. Some early damage was reported from Delaware and New Jersey.

Grasshoppers have been abundant in some areas. Severe infestations were present in cropland in Sheridan, Roosevelt, Daniels, Richland and McCone counties, Montana and there are heavy populations on the range in many parts of the state.

North Dakota reported in early July that the pests were the major insect threat to crops in that state. About 80,000 acres of rangeland were scheduled for cooperative control in the state at that time also. Populations were threatening to severe in several local areas of north central Kansas, and continued to increase in Utah where controls were carried out on over 33,000 acres. Cooperative control is underway on an aggregate of about 300,000 acres in Wyoming.

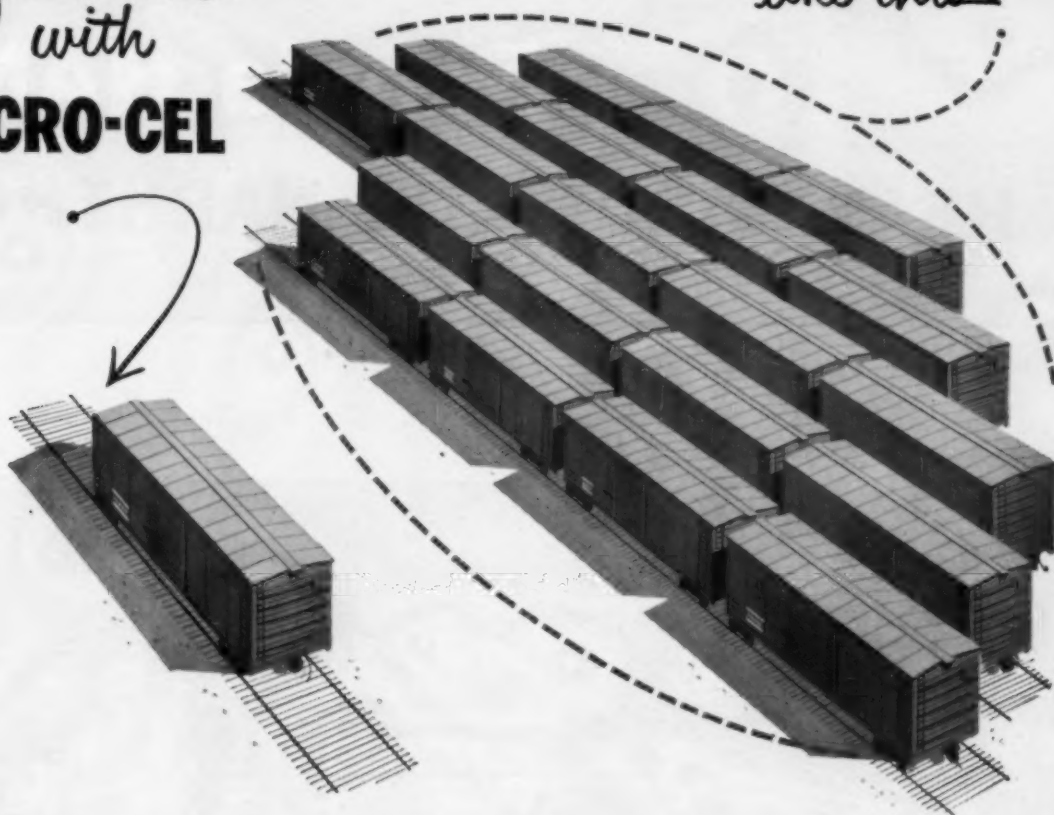
Among fruit pests, mites were perhaps the most active. By the first of July increases were noted in the Carbondale area of Illinois and the Vincennes area of Indiana. Spotted heavy populations were noted in Maryland and in southeastern and south central Pennsylvania. Rapid buildup of the pests was reported from Orleans and Niagara Counties, New York.

Of particular interest to the citrus industry was the finding, in early July, of five adult Mexican fruit flies in southern California all near the Mexican Border. These were the first specimens of the pest trapped in

*This shipment of 50%
Heptachlor concentrate
formulated
with*

MICRO-CEL

*—can provide
application quantities
like this*



The advantages of formulating insecticide dusts at the higher concentrations obtainable with Micro-Cel* is graphically demonstrated by the freight cars above. One car of 50% Heptachlor when let down to a 2½% poison at the point of application produces the equivalent of 20 cars of insecticide in the field. Since Micro-Cel costs no more than many other diluents, the substantial freight savings mean extra profits for you.

PROVEN WITH MANY POISONS

Micro-Cel, a new line of synthetic calcium silicates developed by Johns-Manville, has been tested and proven at such high dust and wettable powder concentrates as:

75% DDT	70% Toxaphene
75% Aldrin	75% Dieldrin
50% Aramite	50% Chlordane

Experiments with other poisons are under way today.

IMPROVES FLOWABILITY

Micro-Cel — "the powder that flows like a liquid" — reduces caking, increases flowability and gives more uniform coverage with dry dusts. Other important properties include large surface area, small particle size and high balking action.

Ask your Celite engineer to help you adapt Micro-Cel to your particular requirements, or mail coupon below.



*Micro-Cel® is Johns-Manville's new absorbent-grinding aid designed specifically for the insecticide formulator.

Johns-Manville
MICRO-CEL

SYNTHETIC CALCIUM SILICATES
A PRODUCT OF THE CELITE DIVISION

Johns-Manville, Box 14, New York 16, N.Y.
In Canada: Port Credit, Ontario
Please send ☐ further information; ☐ samples of Micro-Cel. I am interested in using Micro-Cel with the following poisons:

☐ Please have your local representative contact me.

Name _____ Position _____

Company _____

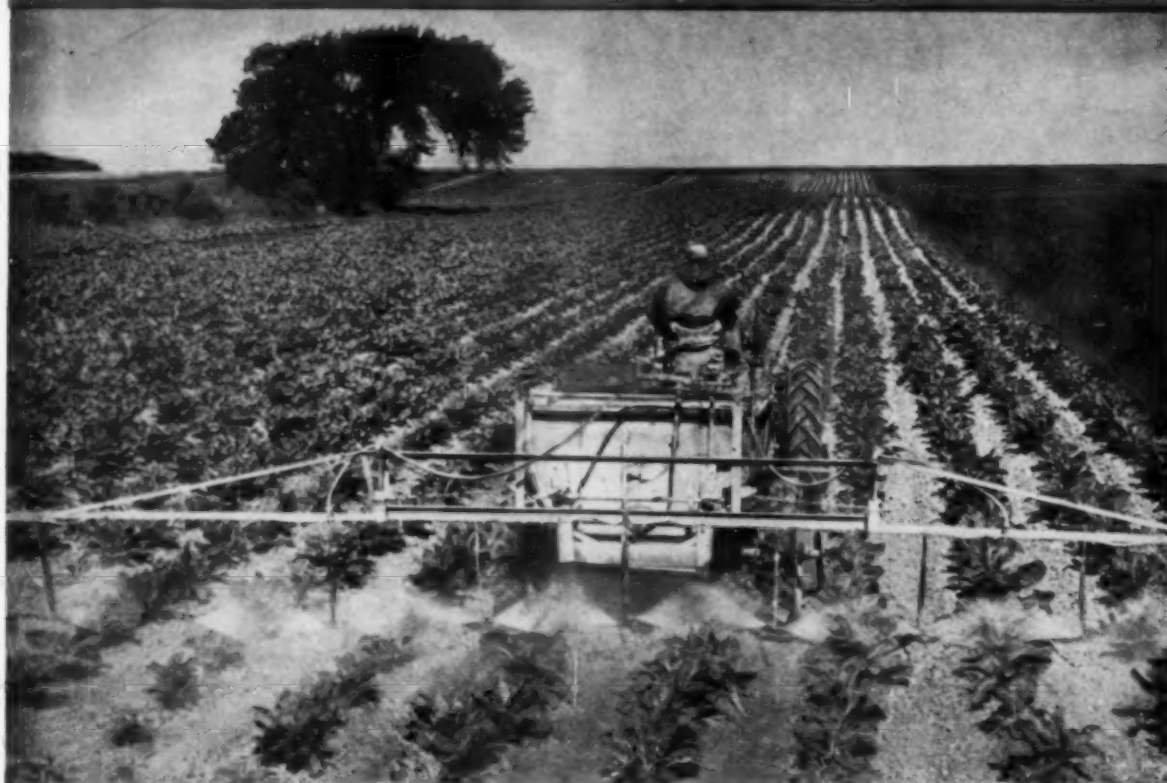
Address _____

City _____ Zone _____ State _____

FOR YOUR PESTICIDES, USE

Penola HAN[®]

HEAVY AROMATIC NAPHTHA



Low in cost and high in solvency, Penola HAN heavy aromatic naphtha blends readily with active ingredients to form efficient, top-quality pesticide concentrates. Its mild odor, light color and high volatility insure low plant toxicity and better consumer acceptance.

Penola HAN is marketed by the Penola Oil Company, manufacturer of Flit — the greatest name in insecticides. For information on how Penola HAN can improve *your* product, call us today.



Penola Oil Company
NEW YORK • DETROIT • CHICAGO

AGRICULTURAL CHEMICALS

California since the summer of 1956. Late in June flies were trapped at Tijuana, Baja California. Ten flies, the first catch for this year, in that area were taken during the month. By the last of the month the 43rd spray application for control and eradication of the insect was underway on the Tijuana side of the border and about 60 such applications had been made in the southern California area.

Boll Weevils Threatening

WEATHER through June and early July was favorable for boll weevil development throughout a large portion of the area where this insect occurs. The weevil was a serious threat in many of the 18 North Carolina counties reporting. Counts in untreated fields ranged from 3 to 80 per cent. South Carolina which had reported serious potentials early in the season recorded infestation increases over the entire cotton-growing area of the state by July 1. Punctured squares were numerous in Georgia with counts in 31 fields in 10 counties in the northern sections of the state averaging 31 per cent. In the middle and southern parts of the state, the average was 20 per cent punctured squares. Five southeastern Alabama counties had an average of 32 per cent punctured squares in a count made during the latter part of June.

Although boll weevil infestations were relatively light in Mississippi in June, control work was under way. Counts during early July in 25 delta fields showed an average of approximately 7 per cent punctured squares. In Madison Parish, Louisiana, punctured square counts in 40 untreated fields averaged 27 per cent and in 35 treated fields 18 per cent.

Conditions in Tennessee in late spring were favorable for a buildup of boll weevils. Overwintered weevils were active and punctured square counts by early July in the southern tier of counties averaged 31 per cent. In Arkansas, weevil activity was below the same period last season. Checks in late June showed a few first-generation weevils appearing in the southeastern part of the state. Of the fields examined, 26 per cent

showed infestation compared with 50 per cent last year. By early July, migration was under way in the lower Rio Grande Valley area of Texas, and considerable boll damage was reported. Infestations were light in the coastal bend, south central, east and central areas. In the southwestern area, infestations ranged from light to medium.

Although cotton bollworms required control in some areas during late June and early July, they were generally light. In west Tennessee some controls were applied, as was the case in Mississippi. Alabama reported light to medium infestations with the exception of Autauga County which was classified as heavy. Arkansas, Texas and Georgia had light infestations. Bollworms were on the increase in Hampton and Marlboro counties, South Carolina but populations were light in the Piedmont and Coastal Plains areas.

Other Insect Activity

BY the first of July, the Japanese beetle was very active. In Virginia, the insect was causing more concern than any other pest, and in Maryland it was more abundant than normal in most sections. Delaware also reported greater abundance than usual. Several heavy infestations were present in North Carolina, Georgia, West Virginia and Pennsylvania. The first adult of the year for the East St. Louis, Illinois area was reported June 19.

The potato leafhopper was causing concern in late June and early July in several sections. The insect was building up on alfalfa, potatoes and beans in areas of Pennsylvania as well as in Delaware and Maryland. In parts of Illinois counts in alfalfa of 500-6,000 adults and 300-8,900 nymphs per 100 sweeps were recorded. Populations requiring control were present in Wisconsin and damage was reported from Iowa and Missouri.

The cooperative Federal, State and local gypsy moth spray program in the Northeastern States for this season was completed in late June. A total of approximately 3,500,000 acres was sprayed during the season with the greater part of the spraying

as follows: New York—2,779,999 acres; Pennsylvania—236,000 acres; New Jersey 193,000 acres; and Massachusetts 120,000 acres. The work this year was part of the long range program to eradicate the pest from this country. Cooperative eradication spraying was also conducted on nearly 19,000 acres in the Lansing, Michigan area.★★

FDA OK's Toxaphene in Cattle

The Food and Drug Administration has established for the first time a tolerance for toxaphene in the fat of meat from cattle. This permits feeding beef cattle with corn forage from corn treated with toxaphene for corn borer control. Tolerance levels are set under a new law requiring the Department of Health, Education, and Welfare to determine what amounts of pesticide residue can safely be permitted to remain on food crops.

In addition, the tolerance of seven parts per million for toxaphene in the fat of meat from cattle, sheep, and goats means these animals can also be sprayed with toxaphene for protection against certain livestock insect pests.

The new regulation further states that the spraying of the animals or the feeding of the animals with toxaphene-treated forage should not take place during the four weeks before slaughter.

In a companion order, the Food and Drug Administration also established a new tolerance of seven parts per million for residues of toxaphene in or on each of the following raw agricultural commodities: cranberries, hazelnuts, hickory nuts, horseradish, parsnips, pecans, peppers, pimientos, rutabagas, and walnuts.

Hessian Fly Active

Two notes of unusual interest regarding the Hessian fly were received recently. The first note from Georgia reported the insect as being heavy in wheat in several southwestern counties. The other note concerns the insect in Washington County, Oregon, where populations were so severe that several fields of wheat were plowed under.

WASHINGTON REPORT

By Donald Lerch



BIG question coming to a head here in Washington is—Who's going to get the job of putting into effect the Welsh Commission report on increased industrial uses of agricultural products? The U. S. Department of Agriculture would like to do it, so would the Commerce Department. Many bills have been introduced in Congress and many meetings behind closed doors are being held throughout Washington as interested parties seek to bolster their positions.

Basis for the scramble is the Commission's finding that neither (1) Increased exports nor (2) Rising population and dietary standards can be relied upon to keep pace with the ability of farmers to produce. This is in sharp contrast with the "Fifth Plate" philosophy proposed by former Secretary of Agriculture, Charles Brannan. This happy philosophy suggested that by 1957, when we would feed five people for every four today, farm surpluses would vanish. A logical conclusion then was that the farm problem was temporary and would, in effect, solve itself.

The Welsh Commission report may be one of the strong underlying findings upon which Secretary Benson is basing his contention that the farm programs of the nation need major over-hauling. The inference is that the farm problem is here to stay and no panacea can be expected.

This change of philosophy then makes the development of industrial markets for Agricultural products of utmost importance. Thus far, industrial markets for agricultural production have received minor consideration by the Government. If the new

thinking of the tremendous importance of industrial markets for agricultural products prevails, then much attention should be directed to the selection of who is to run the program for the Government.

In the final analysis, if the chemurgic idea is finally to be proved practical, industry will have to provide most of the brains and the money for finding out how vast quantities of farm production can be passed through the wizardry of industrial chemistry, physics, and other processes, and come out the other end as useful products for the mass market. Nonetheless, Government has an important role in providing a base on which industrial investment and research can be increased, and a climate in which it can flourish.

Questions being raised in Washington are these:

1. Should Welsh Commission activity go to the U. S. Department of Agriculture?
2. Should this activity be headed by a committee composed of industrial and agricultural leaders?
3. Should this activity go to the Commerce Department?
4. Should a new authority be created?

While the U. S. Department of Agriculture stands in highest respect by most industry leaders, there is the question of whether the Department has the type of personnel best-suited to handle this area of operation. It is my observation that fundamentally the U. S. Department of Agriculture is concerned with "raising the extra blade of grass," and that while marketing activity is part of the department's operation, it's more of an appendage than a vital part.

The outcome of this scramble will have a direct bearing on the agricultural chemical industry. There's every reason to suppose that the drive to reduce the cost of farm production will continue. A conclusion then is, the more acres which can be marketed, the greater can be the dollar sales of fertilizers, pesticides, and plant growth materials.

Here is an opportunity in the making and a chance for the agricultural chemical industry to again demonstrate its statesmanship by helping Washington make decisions which will increase the wealth and general prosperity of not only the industries concerned but of agriculture and the nation.

* * * * *

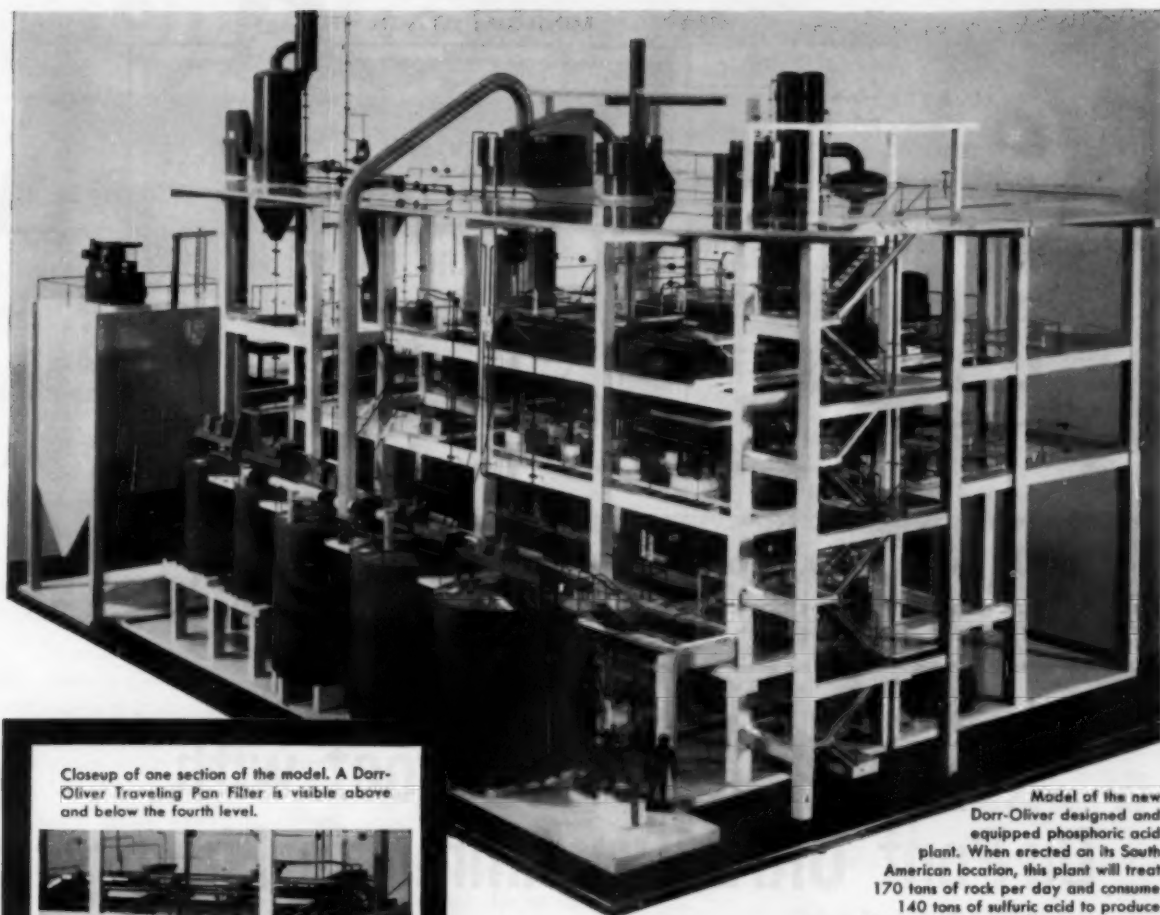
Both the National Agricultural Chemicals Association and the National Plant Food Institute have direct interests in the current hearings on food additives before a sub-committee of the House Inter-State and Foreign Commerce Committee.

The National Agricultural Chemicals Association is establishing the fact that the intent of Congress has been to regulate the pesticide industry separately. Speaking for 90% of the pesticide industry, NAC is saying that the passage of the Miller Amendment, Public Law 518, in 1954 establishes programs and procedures whereby the public is assured a safe food supply with respect to the use of pesticidal materials.

Members of the pesticide industry will remember the lengthy hearings before the Food and Drug Administration which then led to an investigation by the Delaney Committee of

(Continued on Page 91)

AGRICULTURAL CHEMICALS



Closeup of one section of the model. A Dorr-Oliver Traveling Pan Filter is visible above and below the fourth level.



Model of the new Dorr-Oliver designed and equipped phosphoric acid plant. When erected on its South American location, this plant will treat 170 tons of rock per day and consume 140 tons of sulfuric acid to produce 50 tons of P_2O_5 as 54% phosphoric acid.

New Phosphoric Acid Plant for South America...

engineered and equipped by Dorr-Oliver

When this new South American wet phosphoric acid plant goes on stream, it will be operating on a 350 day per year schedule — a result of the flexible design features incorporated in Dorr-Oliver designed plants. Flexibility of design is but one of many features necessary in fertilizer plant design. Dorr-Oliver's Consulting Engineering Department, with 40 years' experience in the field of concentrated fertilizer production via the wet process of manufacturing phosphoric acid, is staffed by engineers fully qualified to handle all phases of fertilizer plant design — from economic analysis to supervision of initial operation.

If you are considering entering the fast growing fertilizer field — or if you plan to expand present plant facilities — it will pay to check with Dorr-Oliver. Write for a copy of Bulletin No. 8000, or better still, let us send an engineer to discuss your problem from the standpoint of economics and process. No obligation, of course.



DORR-OLIVER

INCORPORATED

WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.



Granulating is fireproof with Du Pont URAMON® Ammonia Liquors

Du Pont "Uramon" Ammonia Liquors give you maximum safety in high-temperature granulating by eliminating dangerous flash fires in the mixer; and, further, by assuring safety in the pile.

Fireproof conditions are maintained in the mixer when Du Pont UAL is used. As the ammoniation proceeds, the ammonium carbamate in UAL changes to ammonia and carbon dioxide. Ammonia enters the reaction and carbon dioxide displaces the air, thus creating conditions that guard against combustion.

Four formulations are available . . . all are equally safe for granulating. For technical assistance and information on the solution best suited to your use, write Du Pont.

HERE ARE OTHER IMPORTANT ADVANTAGES OF DU PONT URAMON® AMMONIA LIQUORS:

- High-quality nitrogen from UAL resists leaching . . . supplies both urea and ammonium forms of nitrogen.
- Won't corrode regular fertilizer manufacturing equipment, including ordinary steel and aluminum.
- Gives mixed goods better "feel"—minimizes caking, segregation and dusting.
- Suitable for either batch or continuous mixing.
- Prompt, dependable delivery enables you to schedule your production with confidence.



URAMON®
AMMONIA LIQUORS

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. DU PONT DE NEMOURS & CO. (INC.)
 Polychemicals Department • Wilmington 98, Delaware
 1616 Walnut Street Philadelphia 3, Pa. 7250 N. Cicero Ave.
 Chicago 30, Ill.

Du Pont Company of Canada (1956) Limited
 85 Eglinton Avenue East, Toronto, Canada

TECHNICAL SECTION



Herbicide Controls Grasses With One Application

A NEW weed killer, said to be the first to eradicate hard-to-kill Johnson, Bermuda and other weed grasses with a single application, has been announced by General Chemical Division, Allied Chemical & Dye Corp., New York.

Developed by General Chemical's research department, the product is known as Hexachloracetone and is being marketed in a number of formulations under the trade name HCA Weed Killers for use in non-crop areas. HCA is designed for use with ordinary weed oils and not only materially increases their performance and efficiency but exhibits excellent properties of its own. It prevents resprouting of noxious grasses by killing the roots, gives full season control when applied at almost any time of the year, and kills weeds without sterilizing the soil. In addition, HCA in oil gives immediate results by "killing back" top growth in from 12 to 48 hours after spraying.

The importance of these traits was discussed by a company spokesman who pointed out that the root killing action of HCA becomes apparent when sprayed grasses are compared to stands treated only with weed oil. HCA treated grasses do not resprout as do those treated with oil alone. Full season control is generally obtained from a single application and there are many instances where one spray of HCA Weed Killer has eradicated Johnson grass for a full year after treatment. Since foliage turns brown shortly after spraying, maintenance crews can quickly see the spots they have missed and attend to

them while still in the area. The company also stresses that HCA can be applied effectively at any time of year when sufficient moisture is present for good weed growth . . . a distinct advantage when small maintenance crews have large areas to treat.

The new herbicide is available in two forms: HCA Weed Killer Concentrate for dilution in oil and as a finished spray product called HCA Weed Killer which contains 2% HCA in an aromatic weed oil.

General Chemical Division's Agricultural Department reports that HCA is most effective when there is sufficient water in the soil to promote rapid growth of vegetation. While best results are obtained from HCA-aromatic oil mixtures, good control is also given when kerosene or diesel oil is used as a carrier. HCA mixes completely with these oils, and the mixtures will remain homogeneous without the aid of agitation. It can be applied easily with ordinary weed oil sprayers and no special safety equipment for workmen is required as with some herbicides.

The company said that HCA shows such promise, it is currently undergoing tests in 31 states for agricultural use. At present, however, the product is recommended only for industrial and commercial maintenance and for weed control in non-crop areas of farms. It is particularly effective on railroad tracks, drainage ditches, pipe and transmission lines, roadsides, other rights-of-way, fence rows, and around farm buildings.

Fumigant Patent To Stauffer

A patent has been assigned to Stauffer Chemical Co., New York, which covers a method of stabilizing solutions of sodium-N-methyl dithiocarbamate and kindred compounds. This chemical is the essential ingredients of the soil fumigant marketed by Stauffer under its Vapam trade-name.

The Stauffer research has developed a method to curb decomposition of the compound by the addition of small percentages of amines. Aliphatic primary amines, such as methyl, ethyl, propyl, and butyl, are cited as being preferred. The method is covered by U. S. Patent 2,791,605.

Chlorides on Field Crops

Research is being conducted at the Ohio Agricultural Experiment Station, Wooster, Ohio, on the effect of chloride fertilizer salts on the yield and mineral composition of corn, wheat, oats, and bluegrass. Although the studies have not been completed, two years of field experiments indicate that the yield of crops fertilized with ammonium chloride as a source of nitrogen in mixed fertilizers or applied as supplemental nitrogen was not different from yields produced with ammonium sulfate or ammonium nitrate sources of nitrogen used in the same manner.

The yield produced by corn fertilized with 300 and 450 pounds of 5-10-10 starter fertilizer that did not contain chlorides was not different from the yield produced by the same rate of 5-10-10 containing ammonium chloride and potassium chloride as sources of nitrogen and potassium, respectively. H. J. Mederski, Ohio Agricultural Experiment Station.

LITERATURE AVAILABLE

The following list reviews a series of bulletins on fertilizer, insecticide, and fungicide recommendations, controls, etc. These bulletins and reports are prepared by agricultural experiment stations, and copies may be obtained by writing directly to the respective stations.

CHEMICAL DEBARKING OF SOUTHERN TREES, by Warren S. Thompson and Keith C. Birdsall. A report summarizing the procedures and results of a study testing the use of chemical debarking in pulping operations in the South. Technical Bulletin 42, Jan., 1957. Mississippi State College, State College, Miss.

THE AGRICULTURAL USES OF PEAT MATERIALS, by A. A. Swinerton and P. O. Ripley. A 15-page booklet describing the composition, manufacture, and uses of peat moss. Farmers Bulletin 147, Nov., 1947. Department of Agriculture, Ottawa, Canada.

MONTANA INSECT PESTS 1955-1956. This is the thirty-sixth report of the State Entomologists of Montana and contains information concerning insect and related pest problems which have occurred in Montana during the last two years. Bulletin 526, Dec., 1956. Montana State College, Bozeman, Montana.

FERTILIZERS FOR VARIOUS CROPS. General fertilizer recommendations for some field crops, market garden crops, small fruits, tree fruits, and tobacco. Publication 870, Nov., 1956 (revision). Canada Department of Agriculture, Ottawa, Ontario.

IRIS BORER AND ITS CONTROL, by John C. Schread. An illustrated booklet describing a serious pest of German and Japanese iris, the native blue flag, and the lily and listing control measures. Circular 202, April, 1957. The Connecticut Agricultural Experiment Station, New Haven.

THE HOUSE MOSQUITO AND ITS CONTROL, by Dr. Lyle E. Hagmann. 4 pages. New Jersey Agricultural Experiment Station Bulletin, New Brunswick, N. J.

SMALL GRAINS IN MISSISSIPPI. 44 pages. Discussion of fertilization, rate of seeding; grain yields; diseases of oats, wheat, barley and rye, and control measures; weed control, insect control. Bulletin 546, Mississippi State College Agricultural Experiment Station, State College, Miss.

AZALEA FERTILIZATION. 16 pages. Nutrient element deficiency study; influence of rates and grades of fertilizers, type of organic matter, and minor elements. Circular 118, April, 1957, Agricultural Experiment Station of the Alabama Polytechnic Institute.

Late Season Weevil Control

Small-plot and large-scale experiments with several insecticides applied as dusts and as low-volume sprays were conducted in central Texas during 1955 for the control of late-season infestations of the boll weevil and the bollworm.

In several experiments Bayer 17147 gave excellent boll weevil control at 0.25 and 0.375 pound per acre. In other tests Strobane and Chlorthion were less effective than toxaphene, and Bayer L13/59 was ineffective. Dieldrin at 0.43 pound per acre compared favorably in control and yield with Bayer 17147 at 0.36 pound in a large plot experiment.

Bayer 17147 at 0.375 pound per acre was ineffective against the bollworm, and at 0.5 pound it was less effective than recommended insecticides. A spray containing Bayer 17147 at 0.375 pound plus DDT at 0.5 pound per acre showed promise in this control.

Late-Season Control of the Boll Weevil and the Bollworm With New

Insecticides in 1955 by C. B. Cowan Jr., C. R. Parencia Jr., and J. W. Davis. *Journal of Economic Entomology* 49, No. 6, pp. 783-785.

O.K. Toxaphene On Lettuce

Federal label registration for the use of toxaphene insecticides on lettuce and cabbage has been received by the Agricultural Chemicals Division of Hercules Powder Co., Wilmington, Del. The U.S.D.A. accepted the following label directions for treating lettuce and cabbage crops with toxaphene.

On head lettuce, label directions call for a seven-day preharvest interval after application of toxaphene, along with instructions for the removal of outer leaves at harvest.

On cabbage, the toxaphene treatment interval before harvest has been modified. The label directions have been accepted subject to a warning that no toxaphene application should be made on cabbage within seven days of harvest. Dosage directions on cabbage which had previously been accepted remain the same.

Safety Hazards Found In Ammonium Nitrate Solutions

THE following is a precautionary warning to all mixers using quantities of ammonium nitrate solutions in formulation of mixed goods along with substantial amounts of 66° Be sulfuric acid. Swift & Co. has found evidence that large, hot lumps which occasionally form and discharge from the mixer may be extremely dangerous if allowed to go into the piled mixed goods without being cooled.

A recent unscheduled shutdown during production of a 12-12-12 grade with 421 pounds of nitrogen solution and 256 pounds of 66° Be (93 percent) sulfuric acid and 33 pounds of anhydrous ammonia per ton of mixed goods necessitated dumping the mixer contents on to a separate pile immediately after shutdown and, therefore, by-passed the normal cooling operation. This small pile soon began to evolve dense white fumes and gave evidence of spontaneous reacting throughout the entire mass. A temperature check indicated

the heat generation had brought portions of the pile up to over 500°F. The reaction was brought under control in about 30 minutes after the pile had been thoroughly broken up, spread with dolomite and flooded with water.

A recheck of operations, after starting up, indicated that occasionally a few lumps would come out of the mixer which were extremely hot and evolving white dense fumes. A coarse grid was installed at the mixer discharge to separate these from the freshly mixed goods going to the cooler.

Laboratory studies were then carried out which indicated that fertilizer salts promote the rapid breakdown of ammonium nitrate when heated. Such mixtures, when heated to 420°F, begin a slow decomposition of the ammonium nitrate which eventually is destroyed. Moreover, when a mixture contains about six percent or more of ammonium nitrate and is heated to 450°F, the break-



Arcadian® News

Volume 2

For Manufacturers of Mixed Fertilizers

Number 8

Crops need the SULPHUR in Ammoniated Superphosphate

MANY SOILS NEAR DANGER POINT OF SULPHUR DEFICIENCY

Analysis of the minerals in crop plants has always been useful in determining plant food needs. When scientists discovered that barely one fourth of the sulphur in a crop plant was recovered in the ash, they began to realize the vital importance of sulphur as a plant food.

Crops, on the average, remove about as much sulphur from the soil as they do phosphorus. Yet the average soil contains only half as much sulphur as phosphorus.

With the increase in use of sulphur-deficient triple superphosphate and ammonium phosphate in concentrated fertilizers, much land gets little sulphur. This secondary plant food element is more and more apt to limit crop yields and profits. Soils in the Southeast, the Pacific coast, the Intermountain areas, and in the northern Midwest have already shown signs of sulphur deficiency.

Rich Source of Sulphur

But the fertilizers you make with ammoniated superphosphate are a rich source of sulphur. Normal superphosphate contains more sulphur and more calcium than phosphorus. Since you charge your customers only for the guaranteed nitrogen, phosphoric acid and potash in mixed fertilizer, you are giving a bonus in calcium and sulphur for the mere cost of transportation.

Sulphur leaches out of the soil almost as fast as potash or calcium, and it needs

to be applied frequently. In an analysis of drainage water in the James river in Virginia, sulphuric acid made up 5% of the solids in the river water, while there was only a trace of phosphoric acid. A similar test of the Pecos river in Texas showed 44% of the solids in the water was sulphuric acid, and only a trace was phosphoric acid. A little sulphur comes back to the land in rain, in coal and oil burning or smelting areas. This amounts to only 5 to 30 pounds per acre.

Sulphur Increases Yields

Legumes, grass, cotton, tobacco, corn, and all plants in the cabbage, onion and mustard families require considerable sulphur for high yields. Sulphur also is needed for good nodule formation on legume roots. Symptoms of sulphur deficiency appear in many crops as pale green leaves, not to be confused with the drying up of older, lower leaves, typical in nitrogen deficiency.

With cotton, lack of sulphur reduces yield of seed cotton, number of bolls matured and rate of growth. In 12 Alabama tests on a wide range of soils, cotton response to sulphur showed an average increase of 161 pounds of seed cotton per acre.

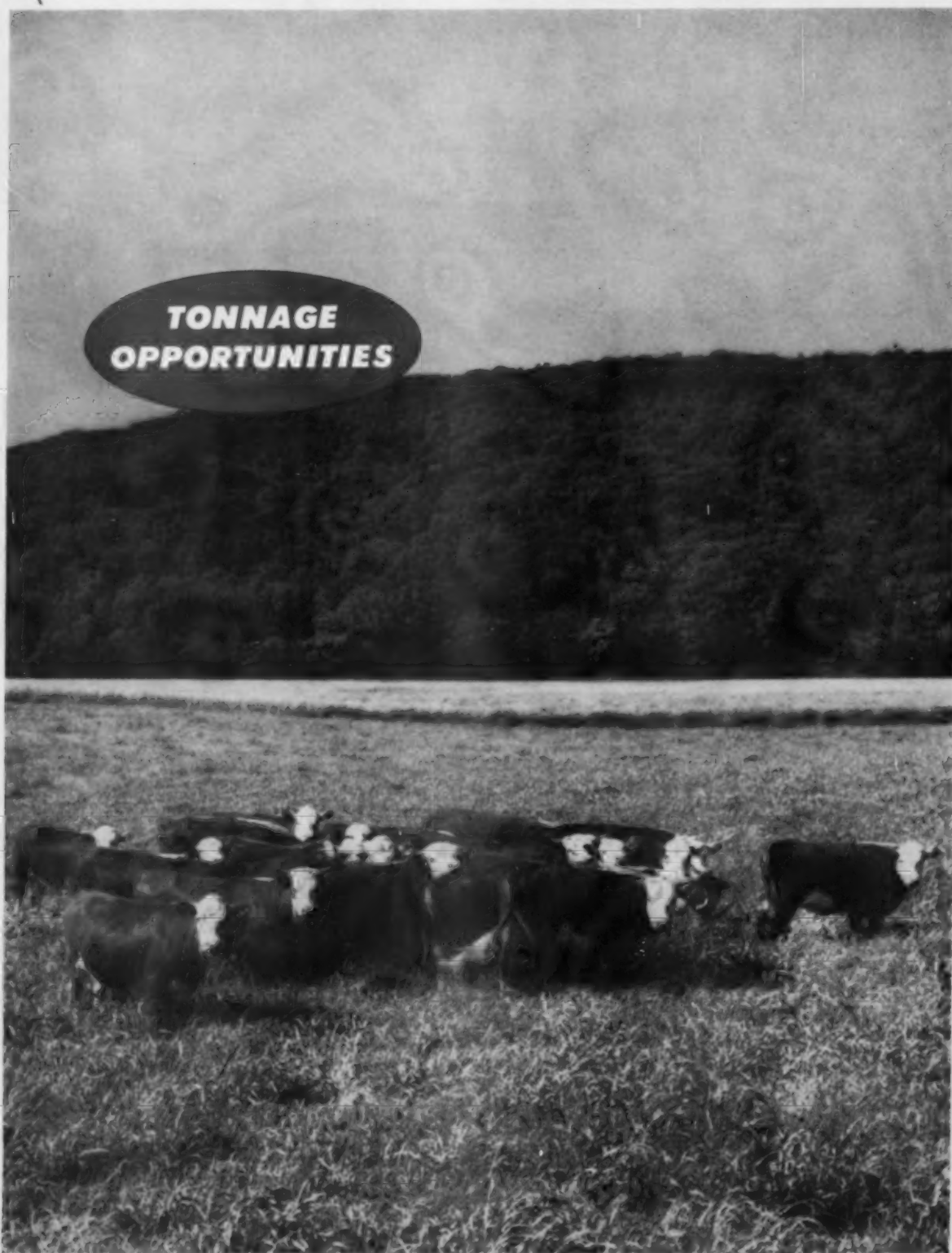
In a three-year test on typical Southeastern soils, white clover produced poor yields when sulphur was omitted from the fertilizer. In an alfalfa test, yield was

1 ton per acre without sulphur, and 6½ tons per acre with 300 pounds of sulphur. With 600 pounds of gypsum or 820 pounds of superphosphate in fertilizer, yield was 8½ tons per acre.

Officials Know Benefits

The growing concern over sulphur and other secondary and minor elements is aptly summarized by Dr. Howard T. Rogers, head of agronomy and soils work at Alabama Polytechnic Institute: "There is no doubt about the importance of calcium, magnesium and sulphur in fertilizers for Alabama crops and soils. As long as all mixed fertilizers sold in the state contain adequate amounts of these elements, their regulation will not be of serious concern. However, if sulphur-free mixtures are marketed in appreciable quantity, it would appear advisable to consider regulation and control of this element. . . . If complete fertilizers without sulphur, such as some of the nitric phosphates, are offered for sale (in Alabama) the Experiment Station will not recommend their use on cotton."

When you ammoniate superphosphate as a base for mixed fertilizers, you are giving farmers a big extra value in free sulphur and calcium essential to profitable crop production on many soils. It pays to tell your customers about these extra benefits.



Grass and trees are two big tonnage opportunities for development by the fertilizer industry.

FERTILIZER MAKES GRASS GROW HIGH-PROTEIN FEED

More fertilizer is needed on grass pasture and haylands. Its use can bring big profits to farmers and to fertilizer manufacturers.

For example, most haylands produce only 1½ tons of low-protein feed per acre, and pastures even less. But many leading farmers now are using several hundred pounds of mixed fertilizer per acre. The result? Yields range up to 4 or 5 tons per acre of high-protein feed, and these farmers reap a sizable return on their fertilizer investment.

Outstanding Results

Wisconsin dairymen and farmers have achieved outstanding results by using 500 pounds of 10-10-10 per acre on mixed legume-grass and grass meadows. In 403 farm tests, this fertilizer brought, on the average, an extra 1½ tons of dry weight feed per acre, with total yield averaging more than 3 tons per acre. Unfertilized land ran just under 1½ tons of feed per acre. The extra feed produced by fertilizer was worth \$61 per acre more than the fertilizer cost.

Continuing New Jersey experiment station work is successfully producing high-protein, high-tonnage pasture and hay forage. Feeding tests show that well-fertilized, deep-rooted grasses produce about as much milk as alfalfa and higher daily weight gains of beef and mutton. Persistent stands of well-fertilized grass may replace alfalfa on millions of acres where alfalfa is expensive to grow and stands last only 3 years.

Yields of grass forage in 3½ years of New Jersey tests have averaged as high as 3½ to 4½ tons dry weight per acre, with protein content of 15 to 19%. Total digestible nutrients in the grass were approximately 64 to 68%, somewhat higher than alfalfa and equal to a good grain ration.

Need Balanced Fertilizer

The New Jersey grass plots all were fertilized with 500 pounds of 5-10-10 at seeding time. They also received the equivalent of 1,000 pounds of 10-10-10 each succeeding year, with additional nitrogen on the highest yielding plots. This practical level of fertilization produced 4 tons per acre of grass hay, con-

taining 1,230 pounds of protein, at a fertilizer cost of \$48 per acre. The home-grown protein cost only 4 cents per pound—far less than any protein supplement.

Balanced Growth

In mixed legume-grass seedings, many farmers like to use high-nitrogen fertilizer to keep up the grass content of the mixture to control bloat. Because grass is a better forager for potash than legumes, this may speed disappearance of legumes from the mixture. Balanced fer-

tilizer such as 10-10-10 supplies the potash to help legumes, as well as nitrogen to build big grass yields and high protein content.

Fall is an ideal time to fertilize pastures and haylands. Spreading is faster and easier on the firm soil. The fertilizer not only produces more feed, but also builds strong food reserves in the roots for earlier growth and earlier grazing in the spring. The more pasture and hayland fertilizer you sell to farmers this fall, the more profit you and your customers will make!

FOREST TREES ARE A BIG MARKET FOR FERTILIZERS

Trees respond to fertilizer just as other plants do. Farmers, paper and lumber companies, and state experiment stations are now conducting many tests to find out how well forest tree fertilization pays. Now is a good time to run some tests on tree feeding in your area, to prepare for this big potential market.

In another 50 years we will need twice our present production of 47 million board feet of lumber. Use of pulpwood has shown an enormous increase. And our growing population uses Christmas trees in increasing quantities each year.

490 Million Acres

We are now planting nearly a million acres of forest trees per year. But more than half of our 490 million acres of commercial forest land is in a poor state of productivity. Much of this land can produce more wood and more income faster with fertilizer.

Some of the tests of fertilization of forest trees are promising indeed. Tree nurseries have found that fertilizer improves the size and vitality of nursery stock. It also improves the survival and speed of growth of young trees used in forest planting.

Where fertilizer has been used on seed trees left in clear-cut forest land, the increase in seed production has been as high as 1,000 per cent. Fertilization

of partly grown trees also can save much labor in thinning and pruning. The quick growth with fertilizer kills out the lower limbs fast, and also enables larger trees to suppress smaller trees.

Forest soils in different areas vary widely in fertilizer needs. Some need potash, some need magnesium, some need phosphorus, and practically all need nitrogen.

Rapid growth of trees with fertilizer may be better for pulpwood and timber than for fine lumber production. But even Christmas trees benefit from fertilizer under the right conditions. On poor native soils, on eroded or worn out land, and on spoil banks left after strip mining, fertilizer can make a huge difference in tree growth.

Ground application of fertilizer is easy in nurseries and small, level woodlots. For large trees and for rough, hilly and mountainous country, aerial application of concentrated fertilizers is the only practical method.

Write for Information

Now is a good time to establish small acreage fertilization of forest trees and Christmas tree plantings in your marketing area. For information on forest fertilization, write to Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y.

NITROGEN *plus* SERVICE

There are many reasons why it pays you to deal with Nitrogen Division, Allied Chemical. You are served by America's leading producer of the most complete line of nitrogen products. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions for the fertilizer industry. You are assured of dependable supplies from three huge plants at Hopewell, Ironton, and

Omaha. Your nitrogen is delivered to you by the best transportation facilities and equipment. You get technical assistance and formulation advice from the largest and most efficient staff of nitrogen experts. Your sales are supported by the most powerful advertising campaign ever conducted to sell fertilizers. Nitrogen Division is your headquarters for **NITROGEN *plus* SERVICE**. Look over the big line and contact one of the 14 offices listed below.



Nitrogen Solutions

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®								
2	41.0	22.2	65.0	—	12.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	1.147	18	26
3	41.0	26.3	55.5	—	18.2	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	1.194	7	61
6	49.0	34.0	60.0	—	6.0	1.052	48	-52
7	45.0	25.3	69.2	—	5.5	1.134	22	1
URANA®								
10	44.4	24.5	56.0	10.0	9.5	1.108	22	-15
11	41.0	19.0	58.0	11.0	12.0	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	1.081	25	-7
13	49.0	33.0	45.1	13.0	8.9	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	1.052	29	1
U-A-S®								
A	45.4	36.8	—	32.5	30.7	0.925	57	16
B	45.3	30.6	—	43.1	26.3	0.972	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	0.618	211	—

Other **ARCADIAN®** Nitrogen Products: **UREA 45 • A-N-L®** Nitrogen Fertilizer
Ammonium Nitrate • American Nitrate of Soda • Sulphate of Ammonia

NITROGEN DIVISION Allied Chemical & Dye Corporation

MAIN OFFICE: 40 Rector Street, New York 6, N. Y., Phone: Hanover 2-7300



Branch Offices
Hopewell, Va., P. O. Drawer 131 Cedar 9-6301
Ironton, Ohio, P. O. Box 98 Ironton 8-4366
Omaha 7, Neb., P. O. Box 166 Bellevue 1464

Raleigh, N. C., 16 W. Martin St. Temple 3-2801
Columbia 1, S. C., 1203 Gervais St. Columbia 3-6676
Atlanta 3, Ga., 127 Peachtree St., N. E. Jackson 2-7805
Memphis 9, Tenn., 1929-B South 3rd St. Whitehall 8-2582
Columbia, Mo., P. O. Box 188 Gibson 2-4040

Indianapolis 20, Ind., 6060 College Ave. Clifford 5-5443
Kalamazoo, Mich., P. O. Box 869 Kalamazoo 5-8676
St. Paul 4, Minn., 45 N. Snelling Ave. Midway 5-2864
Los Angeles 5, Cal., 2999 West 6th St. Dunkirk 8-3201
San Francisco 4, Cal., 235 Montgomery St. Yukon 2-6840

down becomes extremely rapid and is self-sustaining. A large temperature increase in the product results from this fast decomposition. Hence, in order to avoid the possibility of generating a self-sustaining reaction within a pile of freshly made goods, it is evident that no extremely high temperature lumps should ever be allowed to become submerged in mixed goods with a large percentage of ammonium nitrate. Conservative calculations indicate that a six inch diameter lump which has undergone the spontaneous reaction requires a minimum of 10 minutes to cool to 400°F on exposure to usual ambient air flow in rotary coolers.

This experience at Swift & Co. and its laboratory studies emphasize that (1) no large, hot lumps of high solution mixtures should ever be allowed to reach the storage pile, (2) solution, acid and dry solids fed to the mixer should be kept within reasonable balance at all times, (3) localized over-heating in the mixers should be avoided, (4) large, hot lumps must be diverted by grids to prevent them from reaching the storage section, and (5) temperature levels above 450°F can initiate a dangerous spontaneous reaction in fertilizer mixtures having six percent or more ammonium nitrate.

Insecticide for Rice Stinkbug

The USDA, Agricultural Research Service has approved the following insecticides for use on growing rice to control rice stinkbug:

Aldrin .5 pound actual aldrin per acre, with caution against application within 21 days of harvest. This use is covered by tolerances of .1 ppm on grain and .75 ppm on straw.

Dieldrin .25-.5 pounds of actual dieldrin per acre, with a caution against application within 30 days of harvest. This use of dieldrin is covered by tolerances of .1 ppm on grain and .75 ppm on straw.

Toxaphene .20 pounds of actual toxaphene per acre, with no interval being required between last application and harvest. Straw and threshings from rice which has been treated with toxaphene should not be fed to livestock. While this use of toxaphene is not covered by a tolerance at the present, there is no information on file which would lead to the belief that there should be any change in the policy of continued acceptance.

USDA Registers Trithion

Trithion, an organic phosphate insecticide and acaricide developed by Stauffer Chemical Co., New York, has been granted registration by the U.S. Department of Agriculture for mite and insect control for non-residue uses on a number of crops. Previously the compound has been sold only on an experimental basis.

The new approval permits the post harvest use of trithion on deciduous orchards, cotton, seed crops, beans, and almonds.

Trithion has a long residual effect and kills not only mites and aphids but also their eggs.

Alfalfa Weevil In Conn.

More than 50 years after its introduction to the United States from Europe, the alfalfa weevil has been found in Connecticut. One adult weevil has been discovered in a Hamden planting of alfalfa by Richard J. Quinton, an entomologist at the Connecticut Agricultural Experiment Station.

New Books

General and Applied Entomology by V. A. Little. Published by Harper & Brothers, New York. 543 pages, \$7.

This is a textbook written for students beginning a study of entomology and treats the science as a whole with balanced consideration of taxonomy, morphology, physiology, biology, and control. The author, who is a professor of entomology at The Agricultural and Mechanical College of Texas, College Station, Texas, has drawn upon more than 30 years of teaching experience in compiling the text.

More than 300 illustrations, a glossary of terms, and a selected bibliography make the book appropriate as a supplementary or reference book for pest control operators and for county agricultural agents as well as students.

Plant Pathology

Plant Pathology, Second Edition by John Charles Walker. Published by the McGraw Hill Book Co., New York. 707 pages, price \$10.

This general text describes in detail the symptoms, causal factors, disease cycle, and control of nearly 100 representative diseases of plants. The diseases include all the major types occurring among the chief agricultural crops and forest trees.

The principles of plant pathology are discussed in seven chapters covering such subjects as: definitions and terms, classification of diseases, history of plant pathology, environ-

mental relations, host-parasite interactions, disease resistance, and various types of remedial measures. In this second edition each subject has been brought up to date and the literature lists have been changed accordingly.

Complete life histories, illustrations of many disease organisms, and comprehensive lists of original articles further aid the student in the study of this text which is a valuable introduction to the technical or scientific background of the field.

The author is a professor of plant pathology at the University of Wisconsin.

Weed Control

Weed Control Handbook, 1957, issued by the British Weed Control Council, London, 163 pages, price 5 shillings.

This is a guide to the use of chemicals for weed control and is based on the 1956 Handbook. The text has been considerably revised and enlarged. New sections are included on flower crops, ornamentals, and water weeds. In the general information chapters, there are new sections dealing with weeds in relation to seeds certification schemes, insurance, and the use of weedkillers as well as a comprehensive table summarizing the physical, chemical, and toxicological properties of herbicides.

The British Weed Control Council is intending to issue new editions of the handbook yearly. The first issue was in 1954.



YOU INCREASE PROFITS WHEN YOU USE

TRIANGLE BRAND COPPER SULPHATE

IN YOUR FUNGICIDE AND FERTILIZER FORMULATIONS

Since 1885, successful growers have preferred Triangle Brand Copper Sulphate in fungicides. It has consistently proven itself more effective and superior to organic materials; in sprays, where Bordeaux Mixture is the most reliable, or in dusts, if preferred.

In mixtures and emulsions, it is compatible with virtually every other pesticidal material. In fertilizers, it is important for enrichment of the soil and its use guarantees larger, healthier and more profitable crops. Forms of Triangle Brand Copper Sulphate available are:

INSTANT (powder) for quick and efficient mixing of Bordeaux sprays.

DIAMOND (snow) small or large crystals, all containing 25.2% metallic copper.

BASIC Copper Sulphate in powder form, containing 53% metallic copper.

Contact us today for further information on TRIANGLE BRAND COPPER SULPHATE and its use in your agricultural formulations.

PHELPS-DODGE
REFINING CORPORATION

300 PARK AVE., NEW YORK 22, N.Y.
5310 W 66th STREET, CHICAGO 38, ILL.



NEWS about the TRADE



Cooney Heads Flag Sulphur

Ray H. Cooney is the new general manager of Flag Sulphur & Chemical Co., Tampa. He was appointed last month by the firm's Board of Directors.

Mr. Cooney has spent his entire business career in the agricultural field, and has been with the Flag Sulphur & Chemical Co. for the past nine years, serving successively as salesman and sales manager.



Velsicol Adds Gibberellins

The Velsicol Chemical Corp., Chicago, has added Gibberellin to its line of agricultural chemicals. The plant growth stimulant is available in commercial quantities and is offered to formulators for conversion into packaged products for agricultural and home use.

Nat. Potash Strike Settled

The strike which closed National Potash Company's Carlsbad, N. M., mine on June 3rd was settled in mid-July. Company management stated that it would be several days before an adequate work force could again be assembled, and that an additional period would be required before the plant would be able to make any shipments.

APS Meeting Aug. 26 to 28

The 49th annual meeting of the American Phytopathological Society will be held at Stanford University, Palo Alto, Calif., in conjunction with the American Institute of Biological Sciences, on Aug. 26, 27, and 28.

A session on the diseases of cereal and field crops, under the direction of Lawrence Tenson, University of Kentucky, will include talks on re-

sistance of wheat to loose smut, root rot of alfalfa, boll rots and free fatty acids in cotton seed, and the toxic effect of quack grass on growth of alfalfa.

Joseph M. Ogawa, University of California, Davis, will preside over a session on diseases of fruit crops. Among the papers to be presented are; Bacterial blast, a newly recognized disease of almonds in California. Growth repression of pear trees planted following plum, and the relation of field infection to decay in stored Emperor grapes.

Additional sessions will discuss fungicides, mycology and physiology of fungi, diseases of ornamentals and forest trees, nematodes, virus diseases.

U.S. Steel Nitrogen Plant

The United States Steel Corp. has opened a new nitrogen plant at the firm's Columbia-Geneva Steel Division, Geneva, Utah. The installation, the first of its kind in a major steel plant in America, produces high nitrogen fertilizers and basic chemical raw materials for the explosives and rare metals reduction industries.

Morse Addresses NACAA Luncheon in Washington

Under Secretary of Agriculture True D. Morse was the speaker at the annual luncheon for the officers and directors of the National Association of County Agricultural Agents in Washington, D. C., on June 14.

The dinner was sponsored by the National Plant Food Institute. Shown with Mr. Morse (left) are: Paul T. Truitt, executive vice president of the Institute; Dr. H. L. Ahlgreen, chairman of the extension committee on organization and policy of the American Association of



IM&CC Research Director

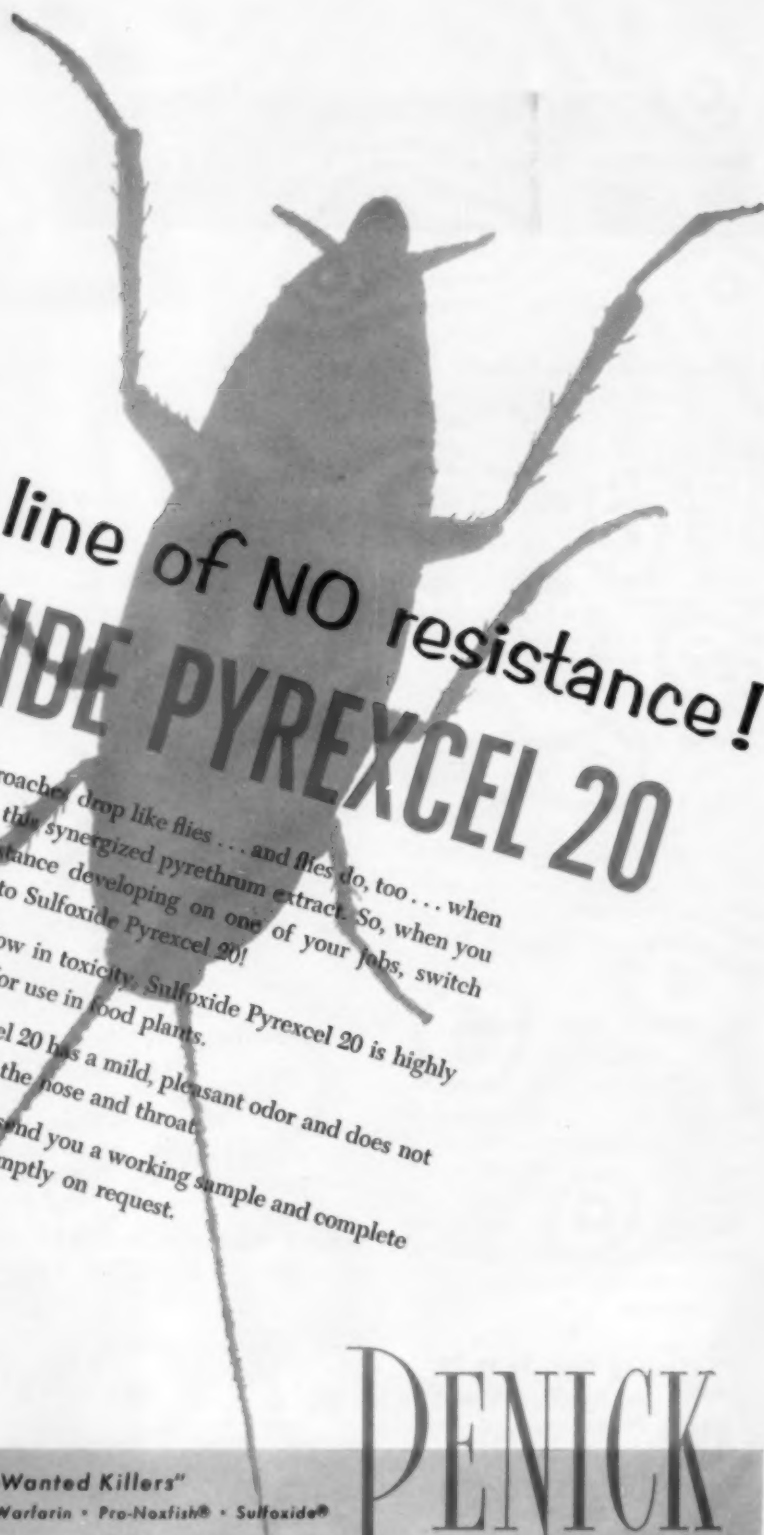
Dr. M. B. Gillis was named director of research for the International Minerals and Chemical Corp., Chicago, and Dr. William C. Knopf Jr. has been named assistant director of research.

Dr. Gillis previously was assistant director of research for organic and biological chemical sciences.

du Pont Wins Decree

The Metol Co., Inc., New York; Alberto Nahmade, president of the Metol Co.; and Harvey Bernes, doing business under the name of Bernes Sales Co., New York, have been permanently enjoined from using the name E. I. du Pont de Nemours and Co., the trade-mark "Karmex," or any of du Pont's other trademarks. This action was taken in a consent decree resulting from civil actions instituted by du Pont, which claimed that the defendants labeled granulated superphosphates with the trade-mark "Karmex" for sale in foreign countries without du Pont's consent, falsely representing them to be compounds manufactured by du Pont.

Land-Grant Colleges and State Universities and director of the University of Wisconsin extension service; Dr. Russell Coleman, executive vice president of the N. P. F. I.; and R. H. McDougall, president of the NACAA.



take the line of NO resistance!

SULFOXIDE PYREXCEL 20

Resistant roaches drop like flies . . . and flies do, too . . . when exposed to this synergized pyrethrum extract. So, when you suspect resistance developing on one of your jobs, switch immediately to Sulfoxide Pyrexcel 20!

Because it is low in toxicity, Sulfoxide Pyrexcel 20 is highly recommended for use in food plants.

Sulfoxide Pyrexcel 20 has a mild, pleasant odor and does not cause irritation of the nose and throat.

We will be glad to send you a working sample and complete use information promptly on request.

"The World's Most-Wanted Killers"

Di-Sodium Methyl Arsonate • Dethmer® Warfarin • Pro-Noxifish® • Sulfoxide®

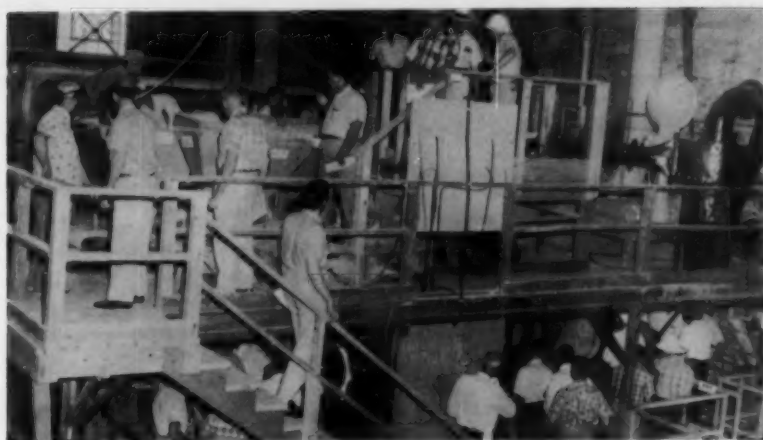


Agricultural Chemical and Insecticide Division
S. B. PENICK & COMPANY 50 CHURCH ST., NEW YORK 8

PENICK

735 W. DIVISION ST., CHICAGO 10

400 Attend TVA Fertilizer Demonstration



ALMOST 400 representatives of the fertilizer industry from 34 states and territories and several foreign countries gathered at Muscle Shoals, Ala., on June 18 for a three-day demonstration of new fertilizer technology by the Tennessee Valley Authority's Fertilizer-Munitions Development Center.

Brig. Gen. Herbert D. Vogel, chairman of the TVA, welcomed the visitors who were mainly manufacturers of fertilizers and of fertilizer making equipment, as well as wholesale and retail distributors.

Six pilot-plant demonstrations, preceded by technical briefings, were held under the direction of Charles H. Young, manager of chemical engineering, J. H. Walthall, director of the division of chemical development, and T. P. Hignett, chief of the development branch. The opening demonstration showed the use of diammonium phosphate in making high-analysis mixed fertilizers. The use of a new high strength phosphoric acid in the manufacture of fertilizers also was demonstrated. TVA tests show that this form of the acid contains only half as much water as the phosphoric acid commonly used in industry and is much less corrosive to metals. It holds forth the prospect of reducing fertilizer-handling costs, producing some grades of fertilizer more cheaply, and producing new and much more concentrated liquid and solid grades of fertilizer.

The second day of the demonstrations featured the production of superphosphates suitable for immediate ammoniation. This involves a new process for making the phosphate product quickly, eliminating the necessity of a long storage period for "curing," and permitting the manufacturer to combine the phosphate with nitrogen and potash materials immediately.

Another demonstration showed the production of ammonium phosphate-nitrates, which are unusually concentrated and entirely water soluble.

A method of making nitric phosphates was shown utilizing equipment requiring much less investment than conventional equipment now in use and having greater versatility.

The final demonstration was of the production of granular superphosphates by a continuous one-step process which improves on present two-step processes in that the cost of rehandling is avoided and a lower moisture content eliminates the need for drying.

TVA has converted the old World War I nitrate facilities near Wilson Dam into a national laboratory and chemical engineering development center. Goals of the project are to improve and lower the cost of fertilizer products and processes, and at the same time act as a chemical center available for national defense.

Co-op Phosphate Plant

Construction of a new co-op phosphate plant in Georgetown, Idaho, has been started by Central Farmers Fertilizer Co., Chicago. The plant is the first step in an over-all \$13,500,000 project on 2,372 acres of phosphate-bearing land in the Georgetown area.

McInnes Heads N. Y. Sales

James McInnes Jr. has been named manager of the New York District Sales Office for Commercial Solvents Corp. Mr. McInnes takes over the post previously held by Arthur W. Luedeke, who heads the company's new Mid-Atlantic office at Newark, N.J.

Mr. McInnes joined CSC in 1933, when the company acquired the Rossville Commercial Alcohol Company with which he had been associated since 1929. He became assistant manager of the New York district sales office in 1945.

4-H Fund Drive Underway

John V. Collis, president of the Federal Chemical Co., Louisville, and R. E. Bennet, president of Farm Fertilizers, Inc., Omaha, kicked off a special fund raising program in behalf of the National 4-H Club Foundation on July 25.

The foundation is currently carrying out a people-to-people exchange of rural young ambassadors between the United States and 50 countries of the free world through the International Farm Youth Exchange. The fund drive is intended to increase the support given to the foundation by the agricultural chemicals industry.

CACA Convention Sept. 15

The fifth annual meeting of the Canadian Agricultural Chemicals Association will be held at Mont Tremblant Lodge, Quebec, from Sept. 15 to 18.

The meeting will include business sessions on the growth and future of the agricultural chemicals industry, tariffs, new products, and selling. The afternoons will be devoted to social and outdoors life in the Laurentians.

Problem:

"Freeing"
imprisoned
products



It's no easy job to open and empty ordinary paper bags that contain chemicals and rock products such as cement. Hard-to-open bags consume time . . . multiply handling costs . . . and retain a wasteful residue of the product after emptying.

Fulton's
Solution:
Bags that zip
open in an
instant



Ful-Zip® multiwall paper bags—with built in rip-cords—zip open like a pack of cigarettes. These bags can be turned inside out for complete emptying . . . reduce labor time . . . and cost only a fraction more than regular bags.

For your packaging or protection problem . . .

Let our Special Services Division show how Fulton products can answer your requirements. We manufacture a complete line of multiwall paper and textile bags, industrial fabrics and made-up textile items. Write: 1416 Annunciation Street, New Orleans, La.



ATLANTA • CHICAGO • DALLAS • DENVER • KANSAS CITY • MINNEAPOLIS
NEW ORLEANS • NEW YORK • OKLAHOMA CITY • PHOENIX • ST. LOUIS • SAVANNAH

IMCC Sinking Potash Shaft

The International Minerals and Chemical Corp., Chicago, is sinking a shaft for a new potash mine in Saskatchewan. The site is on 450,000 acres which International controls under permits near Esterhazy, about 150 miles east of Regina.

The company's potash mine in Carlsbad, N. M., one of the largest in the U. S., has been supplying about 20 per cent of the potash used in this country and the Canadian project is expected to take care of the company's expanding business.

FFA Cites Wilson Meyer

Wilson Meyer, president of Wilson & Geo. Meyer & Co., San Francisco, has had conferred on him by the Future Farmers of America the Honorary Degree of State Farmer in recognition of his work for farm youth.

Mr. Meyer, in addition to heading Wilson & Geo. Meyer & Co., is president of No. 1A District Agricultural Association, a State agency which owns and operates the Cow Palace on the San Francisco-San Mateo County boundary line. The Cow Palace is the home of the Grand National Junior Livestock Exposition, which attracts more than 3,000 farm boys and girls each Easter vacation to exhibit livestock and compete for awards.

Velsicol Promotion Pieces

The Velsicol Chemical Corp., Chicago, has announced the availability of a considerable number of new educational and sales promotion pieces for use by the trade to promote agricultural insecticide sales.

Included in the promotion pieces are streamers featuring Heptachlor, folders on Endrin, and booklets on grasshopper and potato insect control.

N. E. Fertilizer Conference

The annual New England Fertilizer Conference, conducted under the auspices of the National Plant Food Institute, will be held at the Bald Peak Colony Club, Melvin Village, New Hampshire, on Sept. 25.

Discussions at the conference will deal with the influencing factors on the fertilizer-using practices of New England farmers.

New Stauffer Sales Dept.

A new sales development department has been set up by Stauffer Chemical Co.'s Agricultural Chemical Division. The department, which is headed by Francis E. Cook, will be responsible for promoting and developing sales of captan, vapam, triethion, and other compounds.

Others assigned to the sales development department include William B. Shafer and Daniel R. Tuite. The department is headquartered in New York.

Swain Joins W. R. Peele Co.



Box Co., Memphis, representative.

T. S. Swain has joined the W. R. Peele Co., Raleigh, N. C., as assistant general manager. Mr. Swain previously worked with the Geigy Agricultural Chemical Co., Ardsley, N. Y., and the Shelby Paper Tenn., as a sales

Bag Seminar At P. I. Forum

A Bag and Bulk Seminar is planned for this year's Annual Forum of the Packaging Institute at the Hotel Statler in New York on Oct. 28, 29, and 30.

O. J. Burklund, of E. I. Du Pont De Nemours & Co., Inc., is chairman of the Institute's Bag Committee. The seminar will cover problems relating to multiwall bags, can handling methods, and bulk packaging.

Speakers and their subjects for the Bag and Bulk seminar include: J. R. Murphy of Owens-Illinois Glass Corp., a talk on stepped-end multiwall bags; G. T. Stewart, Dow Chemical Co., a discussion of present and future multiwall bag test methods; L. Hennig, American Can Co., speaking on can handling methods for cost reductions and increased speeds; and M. L. Croom, E. I. Du Pont De Nemours & Co., Inc., will discuss industrial bulk packaging, which now includes 15 ton unit containers.

N.J. Controlling Mosquitos

Dr. Bailey B. Pepper, chairman of the Entomology Department at Rutgers University, said recently that New Jersey has lost its unofficial title as the Mosquito State. He said that the mosquito problem is far worse in California and Florida.

Sixteen counties in New Jersey will spend more than \$1,500,000 on mosquito control this year. This money is provided by the county governments. In addition, the state in recent years has been appropriating \$60,000 annually for an aerial spray program in the shore counties of Monmouth, Ocean, Burlington, Atlantic, and Cape May.

All of the county programs are based on research at Rutgers. The research includes a continuing study of the life histories, breeding, and flight habits of the more than forty species in the state.

Agricultural Chemists To Meet

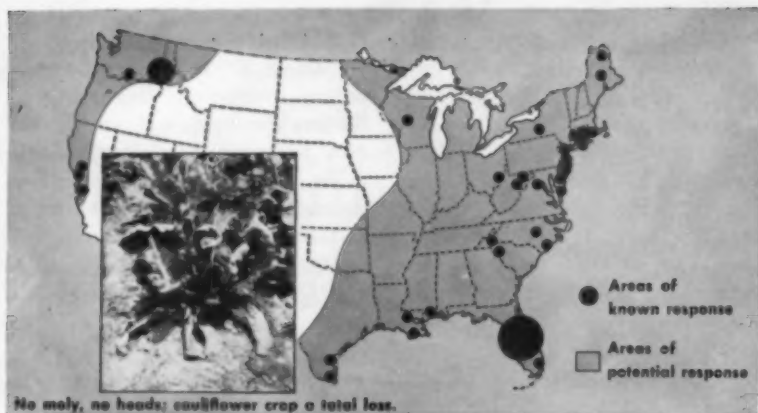
The 71st annual meeting of the Association of Official Agricultural Chemists will be held in Washington, D. C., on Oct. 15.

The evaluation of plant sanitation by the Food and Drug Inspector, the planning of sanitation programs, the role of the laboratory in quality control, the technical and practical aspects of X-ray inspection of cereal grains, and the legal basis for sanitation are among subjects to be discussed.

Baker Sells Chicago Sludge

H. J. Baker & Bro., New York, have been appointed exclusive sales representatives for heat-dried activated Chicago sludge. The company said that it is available in bulk to the fertilizer industry and can be shipped by freight car and barge.

Chicago sludge tests about five per cent nitrogen, four per cent available phosphoric acid, 75 per cent humus, and many trace materials. Besides being used for direct application on turfs and gardens, it is a source of organic nitrogen in the manufacture of complete fertilizers as well. Samples of the sludge may be obtained from the company.



Can You Spot Crops Starved for Moly?

Recognizing moly-deficiency symptoms early enough to recommend moly applications can turn withering crops into healthy stands

At a technical meeting several years ago, someone asked a speaker where responses to molybdenum applications are most likely to be found. The speaker quickly answered, "On soils near an experiment station with a staff member who's familiar with moly-deficiency symptoms and who's testing for molybdenum responses."

This remark wasn't made entirely to provoke a laugh, notwithstanding the need for a little humor at technical confabs.

What the speaker was underscoring was that we didn't then have any idea how extensive the need for moly in the United States might be. There were relatively few agricultural people who knew much about moly, especially its effects in the field. Those few who did—naturally concentrated at places such as experiment stations—found soils that needed moly because they knew what they were looking for.

Dotting the Map

Now some years later, we have expanded our knowledge of moly's role in practical farming considerably. The once few pioneers working on moly at experiment stations are now many. They and other soil scientists at universities and research institutions, as well as farmers themselves, have dotted the map (see illustration) with locations of soils requiring moly for full productivity. At least thirty crops have been shown to respond to moly applications. Of these, ten are now being grown commercially in the United States with the aid of moly.

But, although we have come a long way with moly in just a few years, many growers are still getting marginal yields, or even losing crops, because they don't recognize the symptoms of moly starvation. They can see that something is wrong, but they don't know what. They either haven't heard, or can't

believe, that as little as a few ounces to a pound of moly per acre can mean the difference between skimpy, curled, twisted and scorched plants of little value and healthy crops of prime quality.

Key to Growth

Moly, while required in amounts considered minute even for a trace element, performs two essential functions in plants. It is needed for the fixation of atmospheric nitrogen by the bacteria in the root nodules of legume crops. It also is required in all crops, non-legumes as well as legumes, in the reduction of nitrates to nitrogen—the first step in protein synthesis.

Plants lacking sufficient moly show characteristic symptoms related to moly's key role in plant growth. Legumes have the well-known signs of nitrogen starvation. They are stunted, pale yellowish in color, low in protein content and hard to establish; fields are patchy. Non-legumes exhibit yellowish coloration in the leaves—chiefly in spots where nitrate accumulates between the veins and around the rim—and often the leaves are curled or cupped upwards, or otherwise distorted. Growth is poor and irregular, and the crop has an overall pale yellowish cast.

Some of these symptoms had been recognized as specific diseases—e.g., "whiptail" of cauliflower and "yellow spot" of citrus—for years before moly deficiency was discovered as the cause.

Following are more detailed descriptions of easily detected symptoms in common crops:

Beets. Plants may be stunted. Leaves narrow. Yellowing leaves make red veins stand out.

Cauliflower, broccoli. Whiptail. (See illustration.) Heads do not develop, or develop unevenly.

Cabbage. Yellowish mottling throughout leaf area between the veins. Head-

ing prevented by twisting and cupping.

Peas. Leaves turn yellow and become somewhat translucent. Dwarfing occurs. Vines weak and short.

Beans. Yellowish mottling sometimes called "scald". Flower and seed yield often greatly reduced.

Tomatoes. Curling and cupping of leaves. Formation of flowers and fruit reduced.

Celery. Tops turn pale green, then yellow.

Cantaloupe, cucumbers. Leaves are light green to yellow, develop edges which wither and curl. Stunting.

Differences in Soils

Crop response to moly application is often observed on soils of low pH, since under acid conditions moly is often tied up in a form unavailable to the plant. Liming, in making the soil more alkaline, releases moly to plants, and on some soils, this release of acid-bound moly may be the chief function of lime. In such cases, a few ounces of moly may be more effective and economical than several tons of lime.

Soils likely to be extremely low in moly are those that have been highly leached, such as coastal sands and hill country soils, soils that have been heavily cropped, and soils in areas of heavy rainfall. Conversely, highly productive, fertile soils, heavily limed or manured soils, and soils in regions of low rainfall are unlikely to produce visible deficiency symptoms, but increased yield and better quality may result from moly application.

In the United States, most reported responses to corrective treatment with moly are in the areas east of the Great Plains, and along the Gulf of Mexico, and in the Pacific Northwest. But until more testing is done, it is unwise to say categorically that crops grown in other areas won't respond to moly.

No Trick to Testing

Deficiency symptoms and soil types are good guides to the possible need for moly but they aren't infallible diagnostic aids. Systematic testing should always precede general application to the field.

It's easy to do:

The first step is to make up a stock solution by dissolving one ounce of sodium molybdate in one gallon of water.

With vegetable crops such as cauliflower, broccoli and beets, select and mark one or more rows in the center of the field. Diluting three cups of stock solution to one gallon of water, apply the moly to the test rows, at the rate of one quart per 250 feet of row. Compare treated and untreated rows every other day.

With legumes such as alfalfa and clover, lay out a test plot 10 yards square adjacent to an untreated area to be used as a control. Follow your usual fertilizer program, but use no nitrogen on either control or test plot. Spray the test plot with one cup of stock moly solution diluted to one gallon. Applications can be made at seeding time or to an established stand. Make regular observations, comparing thickness of stand, color and quality of growth.

For a one-ounce test sample, and further information on how to lay out test plots, address Dept. 43, Climax Molybdenum Company, 500 Fifth Avenue, New York 36, N. Y.

Brea, Collier In Merger

Union Oil Company of California has announced the merger of two of its subsidiary corporations, Brea Chemicals, Inc., operating in the petro-chemical field, and the R. T. Collier Corp., operating in the carbon and allied fields.

The new corporation is known as the Collier Carbon and Chemical Corp., with headquarters in Los Angeles. This corporation is continuing to manufacture and market Brea Brand chemicals. R. T. Collier, as president, is chief executive officer of the new corporation and Homer Reed, former president of Brea Chemicals, is vice president.

DDT Study Planned

The New York Zoological Society is trying to formulate, with other organizations, a plan for a detailed study of the effects on wild life of widespread DDT spraying.

Fairfield Osborne, president of the society, said that they are particularly interested in the immediate effect that wide-spread spraying of DDT has on wild life, including native birds, fish ponds and streams, and other forms of life in the natural control systems of nature.

Victor Plans Expansions

The Victor Chemical Works, Chicago, has announced plans for a number of construction projects including a laboratory in the Chicago Heights area, a phosphate plant on 80 acres of land in Richmond, Calif., and an organic products plant at Mount Pleasant, Tenn. It is possible that construction may begin on an extra phosphorus furnace, also at Mount Pleasant, which was planned last fall and then suspended.

Sturtevant Mills In India

The Sturtevant Mill Co., Boston, has been named by Singmaster & Breyer, Inc., New York, as contract supplier for a DDT-formulating plant which will be part of an integrated Indian DDT-producing facility in Alwaye, Southern India.

The new plant will be located directly opposite Fertilizers and Chemicals Travancore, Ltd., an S&B-

engineered project which will supply raw materials for the new facilities. The new plant will turn out four tons a day of technical-grade DDT.

Offer Gibberellin Tablets

The Nitragin Co., Milwaukee, is offering gibberellic acid in tablet form for the consumer market. Called Nitra-Tone, the product is aimed at amateur growers as well as nurserymen and florists.

One tablet dissolved in two ounces of water will give a 10 p.p.m. solution.

Horticultural Soc. Proceedings

The annual report of the Illinois State Horticultural Society for 1956 is in distribution. The 175-page booklet (volume 90) includes reports on fruit insect studies, agricultural product promotion, control of bacterial spot of peach, comparison of fungicides on disease control and yield of concord grapes, effectiveness of some new fungicides for control of apple scab.

Alabama Fertilizer Meeting

The annual Alabama Fertilizer Conference, held July 30 and 31, included visits to the foundation seed stock farm at Thorsby and the horticulture sub-station of the agricultural experiment station system at Clanton. The meeting started with a tour of the main station at Auburn.

Cyanamide Prices Rise

Prices for calcium cyanamide have been advanced by American Cyanamid Co., New York, to the basis of \$57 a ton for granular material. Pulverized material used exclusively in fertilizer mixtures has been increased by 10 cents per unit of nitrogen to the basis of \$2.85. The firm's prices are f.o.b., Niagara Falls, Ontario.

Atlas 1957 Sales Up

In the first three months of 1957, sales and operating revenues for the Atlas Powder Co., Wilmington, Del., were \$16,816,355, a 9.1 per cent increase over the first quarter of 1956.

There has been a slight drop in profits, however, which was attributed to a higher level of expenditures.

Director of Richmond Lab

Stauffer Chemical Co., New York, has appointed Robert P. Obrecht as director of the Richmond, Calif., research laboratory. He is in charge of all research and development activities at that location.

Fertilizer Plant In Italy

Potasse & Engrais Chimiques has been awarded a contract by Societa Azienda Nazionale Idrogenazione Combustibili of Milano, Italy, to erect a 400-600 T/D complex fertilizer plant utilizing the PEC carbonitrile process.

A plant of this type recently was completed for the California Spray-Chemical Corp., at Richmond, Calif., by the Chemical and Industrial Corp., Cincinnati, Ohio, who have the exclusive right to license the PEC processes to users.

Flood Elected To Board

T. F. Flood, vice president of The Frank G. Hough Co., Libertyville, Ill., was recently elected to the Board of Directors by the shareholders of the company.

At the same time, Mr. Flood, who was formerly vice president, Production, was given the added responsibilities of vice president, Sales and Manufacturing.

New Allied Plant Opens

The General Chemical division of Allied Chemical & Dye Corp., New York, has placed in operation a new plant for the production of cotton insecticides at Cleveland, Miss.

Known as the Delta Works, the new plant will formulate all types of cotton dusts and a full range of liquid cotton pesticides. The Cleveland plant is the fifth General Chemical location producing cotton insecticides and basic toxicants. Other plants are at New Orleans, La., Baltimore, Md., Marcus Hook, Pa., and El Segundo, Calif.

Little Joins Am. Potash

E. Robert Little Jr., has joined the American Potash & Chemical Corp., Los Angeles, as an area sales representative in the San Francisco district office.



DIPTEREX*

Sugar Bait Fly Killer

DIPTEREX attracts and kills both resistant and non-resistant strains of houseflies with outstanding effectiveness. It is approved for use inside and around dairy barns, poultry houses, stables, stock pens and similar areas where fly populations are intense or bothersome.

The active ingredient of DIPTEREX Sugar Bait Fly Killer is Bayer L 13/59, a recent chemical development of Farbenfabriken Bayer.

DIPTEREX is available in five pound metal pails packed four to a case and in one pound canisters packed twelve to a case.

*Registered Trademark



CHEMAGRO CORPORATION

"Chemicals for Agriculture—Exclusively!"

437 FIFTH AVENUE

NEW YORK 16, N. Y.

Sales Development Manager

Francis E. Cook was named manager of the newly organized Sales Development Department of Stauffer Chemical Company's Agricultural Chemical Division. Mr. Cook is responsible for promoting and developing sales of Captan, Vapam, Trithion, and other Stauffer compounds.



NPFI Names Dues Committee

The National Plant Food Institute has named a five-man committee "to evaluate the dues structure of the Institute to determine whether there are any inequities" and to report their findings to the Board of Directors at a meeting scheduled for October 30.

The committee follows: William E. McGuirk, Jr., President, Davison Chemical Co., Division of W. R. Grace & Co., Chairman; B. W. Bellinger, Executive Vice President, Tennessee Corp.; J. C. Crissey, Division Manager, G. L. F. Soil Building Service; Hugo Riemer, President, Nitrogen Division, Allied Chemical & Dye Corp.; and Richard C. Wells, President, National Potash Co.

The Committee will consider any differences in views regarding the dues structure as approved by the Board of Directors. Because of the importance of the study, an official report of the findings will not be available until after the Board meeting is held.

Manager of Dallas Branch

J. A. White Jr. was named manager of the Chase Bag Co. branch in Dallas, Texas, recently. Mr. White formerly was in charge of the Chase sales office in Richmond, Va., and has been succeeded there by Floyd W. Clark.

AAC Wins Patent Suit

Chief Judge Paul Leahy of the U. S. District Court in Wilmington, Del., ruled that there was no infringement on patent rights in the case of Elektrokemish A/S, a Norwegian firm, versus the American Agricultural Chemical Co., New York.

Judge Leahy concluded in his opinion that the defendant, American

Agricultural Chemical Co., in its process for the production of elemental phosphorus in its rotating type furnace, did not infringe upon the process patented by Elektrokemish A/S. The judge said further that the validity of the patent had not been decided.

Ky. Fertilizer Conference

The annual Kentucky Fertilizer Conference is scheduled for Sept. 4 at the Campbell House in Lexington. The program will feature talks by Experiment Station personnel during the morning, a luncheon, and a visit to agronomy research plots in the afternoon.

USDA Estimates of Fertilizer Production, 56-57, Show Drop

TOTAL supplies of nitrogen, phosphates, and potash for the twelve months ended June 30, 1957, are currently estimated to have been slightly less than for the previous year. This analysis of the fertilizer situation for 1956-57 is presented in a review prepared by the Commodity Stabilization Service, USDA, June, 1957. The estimate is based on industry's reported rates of production rather than on capacity to produce, since capacity is in excess of actual output. The report points out that there also were substantial increases in exports of phosphorus and potash.

The 1956-57 fertilizer season was slow in starting. Throughout much of the fertilizer year great sections of the country suffered from extreme drought. During the first and second quarters reports from the mid-South, mid-West, and Southwest indicated severe crop damage due to high temperatures and lack of moisture. In the Northeast vegetable crops and pastures were hard hit by dry weather.

Spring deliveries (March-April) were reported to be spotty with some price cutting, due in part to the slow market. Heavy spring rains, even disastrous floods in some areas, prevented farmers from spreading fertilizer. More normal rainfall in sections of the mid-West, on the other hand, caused an upturn in movement in these sections.

With no yardstick, and no his-

Editors Award To Brandner

Lowell Brandner, agricultural editor, Kansas State College at Manhattan, was the winner of the Agricultural Communications Award for 1956. The award, sponsored by the American Association of Agricultural College Editors and the National Plant Food Institute, was announced at a special dinner ceremony at Colorado State University on July 16.

The annual award was given Mr. Brandner "in recognition of the most notable growth in competence and achievement in agricultural communications during the year 1956," in competition with other members of AAACE at land-grant colleges.

toric pattern to use as a guide, it is hard to predict the impact of the Soil Bank on fertilizer use. Should foreseeable markets seem sufficiently attractive to cover costs and return a reasonable profit, it is logical to suppose that farmers would use more fertilizer on a reduced acreage. However, without experience under this program realistic forecasts cannot be made.

The fertilizer industry, particularly in the case of nitrogenous materials, has more production capacity than it can use at present. However, both private and Government market analysts predict that this is a temporary condition and that demand will be equal to capacity within less than five years.

It is expected that growing demand for all fertilizers will result from increased use in present farm operations as well as from numerous new practices.

Pasture and range fertilization offer opportunities for profitable use of fertilizers; fertilizing microscopic plant growth in farm increases the weight of fish by as much as 400 per cent; forest fertilization, which has only recently been given some attention, is still another substantial potential outlet.

One specific non-farm fertilization program which holds great possibilities for the industry is the new Federal highway program with its attendant roadside development.



This is a section of U. S. Industrial Chemicals' new plant at Tuscola, Illinois, built to produce non-captive P_2O_5 solution . . . latest

addition to the chemical-center where U.S.I. also makes ammonia, nitrogen solutions, and sulfuric acid for the fertilizer industry.

NEW U.S.I. PLANT GOES TO WORK FOR FERTILIZER INDUSTRY

. . . now producing 30,000 tons per year P_2O_5 as phosphatic fertilizer solution (wet process phosphoric acid)

You're looking at the giant filter in the first wet process plant built to supply you with phosphorus pentoxide in the form of wet-process acid. The entire production of U.S.I.'s new unit in Tuscola, Illinois is available for sale to mid-west fertilizer manufacturers, who for the first time have a source of P_2O_5 that is ample, economical, and dependable.

U.S.I.'s new equipment digests phosphate rock with sulfuric acid, and concentrates it to 54-55% P_2O_5 solution, ready to be incorporated in solid fertilizer formulations.

We are set up to serve you promptly. If more information on use of phosphatic fertilizer solution is your first need—or you'd like information on U.S.I. ammonia, nitrogen solutions, or sulfuric acid—your U.S.I. sales representative will gladly supply it. Write us. Or better still, phone.



INDUSTRIAL CHEMICALS CO.

Division of National Distillers and Chemical Corporation

99 Park Avenue, New York 16, N. Y.

Branches in principal cities

When completed, the 41,000 miles of new highways will present an opportunity for the use of a considerable tonnage of fertilizers. According to a statement by the National Plant Food Institute and the American Road Builders' Association an estimated 250,000 to 400,000 tons of fertilizer could be used effectively in establishing these cover crops, while approximately 125,000 to 400,000 tons would be needed annually for maintenance.

Use of fertilizer-pesticide mixtures is estimated to have been 149,000 tons in 1953-54, an increase of 71 per cent over the previous year. It is expected that definite figures regarding the consumption of these mixtures in 1955-56 will be available this fall, when results of a survey by the Soil and Water Conservation Research Division, ARS, will be reported.

Except for 1955-56, in each year since 1937-38 total use of fertilizer has shown an increase. It is expected that the trend toward use of higher analysis materials will continue.

NAC Spokesman Opposes Undue Restriction on Sales

ACURRENT trend in state legislation and regulation practice to force "simplification" on the pesticide industry will ultimately eliminate certain useful pesticides from the market and restrict sales to only those chemicals or formulations specified by state officials, according to L. S. Hitchner, executive secretary, NACA. "Simplification" means reducing the wide variety of pesticides now available to a smaller number.

Mr. Hitchner spoke before the 15th annual convention of the Association of Southern Feed and Fertilizer Control Officials, held late in June in Birmingham, Ala. Mr. Hitchner said the pesticide industry recognizes that there are valid reasons for one state to recommend a certain product, while another does not.

He observed, however, that the industry does object to regulatory proposals which would arbitrarily limit the number and kind of effective formulations which could be sold

14th N.C. Weed Conference

The fourteenth annual meeting and exhibit of the North Central Weed Control Conference at Veterans' Memorial Auditorium, Des Moines, Iowa, on Dec. 10 and 12, will include approximately 150 exhibits of weed control chemicals and equipment.

Various phases of the weed problem will be discussed and sectional programs will cover weed control in industrial areas, field crops, pasture lands, turf and aquatic areas, and horticultural crops.

Kido Is O. M. Scott Director

Dr. George S. Kido has been named director of western research for O. M. Scott & Sons, New Canaan, Conn. Dr. Kido, who recently was director of the insecticide testing laboratory of the Wisconsin Alumni Research Foundation, was formerly associated with Scott's central research division in Marysville, Ohio. He will supervise Scott's research and home-lawn testing program in California and the Northwest.

and used for a specific pest control program. He added, "Enforced simplification would interfere with the right of the manufacturer to sell and the right of the buyer to select a product he wishes from a number of effective materials. This would be equivalent to prohibiting a person from buying a Cadillac because some official has decided that a Ford is better for him."

Mr. Hitchner said that this type of "simplification" is not necessary to make sure that the grower receives a good product at a fair price. "Present legislation is fully adequate to keep off the market inferior products which will not effectively control the pests for which they are recommended and sold."

He added, "The pesticide industry has a record of supporting sound control legislation. Our industry assumes the burden of the research, registration and other costs due to regulations to assure that the farmer gets a good product."

Andrews Joins Miss. Chem.

Dr. W. B. Andrews has resigned his position as agronomist at Mississippi State College to accept the position as technical sales director with Mississippi Chemical Corp. and Coastal Chemical Corp., Yazoo City, Miss.

Dr. Andrews has been associated with the Mississippi State College and the Mississippi Agricultural Experiment Station since his graduation from the Mississippi State College in 1931.

About Apple Pollination

The headline on the article prepared by Avery E. Rich, appearing in the June issue of *Agricultural Chemicals*, was incorrect. It should have stated, "Effect of Various Fungicides Applied During Bloom on Apple Pollination and Fruit Set."

New Phosphate Ore Process

The San Francisco Chemical Co. has completed a plant in Leefe, Wyoming, for processing phosphate ores by a new separation process.

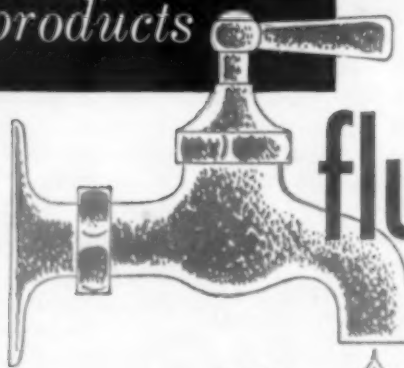
The process, in which finely ground ore is mixed with liquid chemicals, was developed at the Colorado School of Mines research foundation at Golden, Colo. The company expects that the new process will enable them to handle any type of phosphate ore in the west. Western states have about half of the nation's phosphate reserves but currently produce only 10 to 15 per cent of the marketed product.

E. H. Crabtree, director of the School of Mines research foundation, said that the new separation facilities will enable San Francisco Chemical to mine phosphate beds profitably to average depths of 16 feet. With a purely mechanical separation, only ores in the top five-foot layer could be processed profitably. The new process can be used independently or in conjunction with the fluo-solids upgrading process.

Improvements in San Francisco Chemical's fluo-solids or ore roasting separation process will be incorporated in another conversion plant currently planned by the company.

SULPHUR

*helps to
create
headline
products*



fluoridated WATER

Some communities will, some won't... adopt fluoridation of drinking water for the purpose of reducing tooth decay. The subject is hotly debated but one thing is certain: wherever fluoridation is adopted a derivative of Sulphur will enter the picture. Several chemicals can be used for fluoridation but they all stem from hydrogen fluoride. To produce this gas, a fluoride-bearing mineral is reacted with sulphuric acid.

As today's Headline Products are studied, it's significant that so many require for their production one or more derivatives of Sulphur.



Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.
811 Rusk Avenue, Houston 2, Texas

Sulphur Producing Units

- Newgulf, Texas
- Moss Bluff, Texas
- Spindletop, Texas
- Worland, Wyoming

Calspray Appoints Marshall

Dr. Donald S. Marshall has been named manager of the Seed Treating Division of the California Spray-Chemical Corp., Richmond, Calif. Dr. Marshall was previously Eastern Coordinator of Research for Calspray, located at the company's Had-donfield, N.J., research laboratories.

The Seed Treating Division was recently established by Calspray to handle Ortho seed protectants. Dr. Marshall's headquarters are at Richmond.



Bar Thallium Compounds

Texas has prohibited the sale of any insect poison, rat poison, or other preparations which contain thallium sulphate or any thallium compound, in sufficient quantity to be dangerous to humans.

A sufficient quantity has been defined by the Texas legislature as a compound containing more than one per cent of thallium.

Many children are reported to have died in the state during the past two years from accidental poisoning resulting from eating or handling preparations containing thallium sulphate. Thallium compounds were available in grocery stores, drug stores, and other retail establishments before being out-lawed by the state.

Plan Quarantine Expansion

A proposal to include the state of Mississippi in quarantine action because of the recent finding there of the soybean cyst nematode was taken up at the public hearing on July 24, along with previously announced similar proposals to quarantine the states of Arkansas and Kentucky.

The expanded hearing was held in Memphis, Tenn. The newly reported infestation in Mississippi is limited to a single farm in De Soto County, in the northwestern corner of the state.

Plant Contract To C&I

The Mississippi Chemical Corp. has announced the award of a contract to the Chemical and Industrial Corp., Cincinnati, for the design and construction of a 150-ton per day nitric acid plant.

The new plant is to be located at the company's existing facilities in Yazoo City, Miss. This will be the fifth nitric acid unit of the high pressure design which has been installed by the Mississippi Chemical Corp.

Mitchell Wins Wiley Award

Lloyd C. Mitchell, research chemist of the Food and Drug Administration, was the first winner of the annual Harvey W. Wiley Award of the Association of Official Agricultural Chemists. The award, established last year, consists of \$500 in cash and goes to the scientist who makes an outstanding contribution to the development of methods for the analysis of foods, drugs, cosmetics, feeds, fertilizers, pesticides, and soils, or for use in general analytical chemistry.

Mr. Mitchell developed many methods of analysis for spices, cereals, dairy products, and eggs. His studies on the composition of shell eggs and commercial egg products provided the present basis for Chapter 16 of the publication "Official Methods of Analysis of the Association of Agricultural Chemists."

N Use In Australia Lags

Australian farmers give nitrogen a very minor place as a fertilizer for crops and pastures, although Australian soils as a whole are as deficient in nitrogen as any comparable soils in the world, according to Dr. J. S. Russell, senior research officer in the South Australia Department of Agriculture, in an article in the Journal of the Australian Institute of Agricultural Science.

Dr. Russell said that the use of nitrogen fertilizers during the past 20 years in Australia has increased much less than in other parts of the world. He called for the use of more nitrogen and pointed out that the increase in population will require greater areas to be developed to such crops as vegetables, which use large amounts of nitrogen. Dr. Russell also suggested that by using nitrogen fertilizer it may be possible to reduce the traditional dependence on fallowing of land for wheat production.

Westvaco Assistant Manager



Robert J. DeLargey has been named assistant division manager, operations, of the Westvaco Chlor-Alkali Division of Food Machinery & Chemical Corp., New York. Mr. DeLargey has direct charge of the

division's production, research, and development activities.

Mr. DeLargey formerly was director of engineering for FMC's chemical divisions.

Farm Safety Session

A farm safety session is on the program of the 45th annual National Safety Congress and Exposition to be held Oct. 21 to 25 in Chicago.

Safety sessions are scheduled for the Conrad Hilton, Hamilton, Congress, Morrison, and La Salle hotels. Farm safety will be at the Hamilton hotel.

N. Y. Gets Chem. Exposition

The 16th Chemical Exposition will be held in New York's Coliseum from Dec. 2 to 6 this year after an absence of six years from that city. More than 500 exhibitors will occupy all four floors of the Coliseum.

E. R. Weidlein, trustee of the Mellon Institute, has been named chairman of the advisory committee for the exposition which is under the management of the International Exposition Co., New York. E. K. Stevens is the exposition manager.

Profits From Fertilizer

Dr. M. S. Williams, chief agricultural economist of the National Plant Food Institute, Washington, D. C., told the Pennsylvania Fertilizer and Lime Conference that there is a responsibility among county agents and members of the fertilizer industry to help the farmer find out how much fertilizer he needs to use.

Speaking at Pennsylvania State University, University Park, Pa., on July 11, Dr. Williams said that if the farmer understands and applies a few simple principles he can make better use of his plant food. The best way for the farmer to find out how much fertilizer to use, he said, is to get a soil test, to use college recom-

mentations on use of lime and fertilizer, and to fit these to his own situation.

Dr. Williams pointed out that if the farmer applies the proper lime and fertilizer principles, he will increase his returns and profits, will be a more efficient and prosperous farmer, and will be a better customer for the fertilizer industry.

I am convinced, he said, that farmers want to know more than just physical response to plant food. They want some guides from the economist and the fertilizer dealer as to what effect the use of plant food will have on net profits. I doubt if they expect us, Dr. Williams continued, to be able to tell them to the last cent what returns they can expect. I think they rightly expect some guides that will be accurate enough to help them plan their operations for a year or so ahead.

From a research point of view, Dr. Williams said, the matter of profits from fertilizer and lime is necessarily complicated. We can get the most benefit from our research efforts on these complicated problems by combining the talents of the different scientists, agronomists, soil scientists, economists, engineers, and others. But once we get some answers, Dr. Williams concluded, we must present these to the farmer in the language he understands. He wants to know—What does this mean to me?

Proper use of lime and fertilizer offers one of the greatest opportunities for increasing farm profits available to Pennsylvania farmers, Dr. Williams said in closing.

Montecatini Net Is Up

Montecatini Co., Milan, Italy, a large mining and chemical company, reported a net income of about \$17,504,000 for 1956.

Last year's net is equal to \$1.04 an American share, on the basis of five Italian shares representing each American share, and is up six cents a share from 1955.

Calspray Names Marble

Dr. Vern L. Marble recently was appointed a district agronomist by the California Spray-Chemical Corp., Richmond, Calif.

Atlas Replacing Mo. Units

The Atlas Powder Co., Wilmington, Del., will replace the nitric acid and ammonium nitrate facilities at this Atlas (Missouri) plant during the next nine months at a total cost of approximately \$4,000,000.

The new acid plant will be one of the so-called "self-sustaining" type and the first of its kind to be erected in this country, according to the contractor. Energy released from the burning of ammonia is recovered by the unit to the extent that it provides the full power requirements when operating under design conditions.

The Chemical and Industrial Corp., of Cincinnati, has been granted the contract for the design and construction of the acid unit.

Quarantine For Witchweed

The U. S. Department of Agriculture has announced details of a proposed quarantine to regulate movement of articles that might spread witchweed from 75 farms and localities infested with this plant pest in North and South Carolina.

Areas proposed for regulation in North Carolina include seven farms in Bladen County, one locality and eight farms in Columbus County, five farms in Cumberland County, and one locality and six farms in Horry County. (Localities are areas with boundaries designated by the USDA for quarantine purposes.)

Proposed areas in South Carolina comprise 17 farms in Dillon County, one locality and six farms in Horry County, four farms in Marion County, and a single farm in Marlboro County.

Provisions would be made for interstate movement of regulated articles that have not been exposed to infestation or that have been treated or otherwise meet requirements.

Hearings on the original proposals to quarantine North and South Carolina were held in Washington Jan. 30 and March 5. At the March 5 hearing, farmer representatives from the eight affected counties favored a Federal witchweed quarantine.

The proposed quarantine is the first to be drafted under the joint authority of the new Federal Plant

Pest Act (Public Law 85-36) approved May 23, 1957, and the Plant Quarantine Act of 1912.

A parasitic plant, witchweed causes a destructive disease of corn and other crops of the grass family. The plant, indigenous to South Africa and Asia, is a small, harmless-looking weed with reddish flowers. By penetrating the underground roots of host plants, it may reduce to zero the production of the plant attacked.

Nematode Workshop Aug. 21

Top agricultural scientists will meet in Orlando, Fla., August 21-22 to lead a "workshop meeting" on the damage caused in Florida by nematodes. The meeting will be sponsored by Shell Chemical Corporation's Agricultural Chemical Division. This is the second workshop of its kind,—the first held in New York early this year covering nematode problems in the northeastern states.

Reports will be given by agriculturists from the University of Florida, USDA, and the Florida State Plant Board, on the nematode problem, economic effects of the pests, types found in Florida, and methods of control.

Flies Major Pest In Homes

A recent tabulation by the U. S. Department of Agriculture from reports by 33 states points up the nationwide problem of house flies, mosquitoes, and other insect pests of man, his household and his livestock.

About three-fourths of the states reporting listed mosquitoes and house flies among the most important household insects of 1956. Termites and other wood-attacking insects, fabric pests, and cockroaches cropped up as highly annoying pests in more than half of the state lists.

Several insects that normally live out of doors got into enough homes last year to become serious problems. Clover mites were among the top 10 household pests in 11 states, boxelder bugs in five, and earwigs in five. These three insects do no harm to man, animals, household foods or furnishings, but can be a nuisance indoors. Pests of stored foods and grains also ranked high on unwanted-guest lists.

Fifties? Eighties? Hundreds?

NEW ST. REGIS 185-AS BAGGING SCALE BRINGS YOU

5 BIG BENEFITS



HIGH PRODUCTION

20-30 fifty lb. charges a minute
20-30 eighty lb. charges a minute
20-25 hundred lb. charges a minute

FAST GRADE CHANGES

Single bucket design means only one scale has to be adjusted when analysis changes are made. It also permits quick cleanout from the single bin.

LOWER MAINTENANCE COSTS

Single bucket-single beam design and use of air diaphragm cylinders mean fewer wearing parts.

ACCURATE WEIGHTS

At 30 charges a minute, 95% of all charges fall within plus or minus 5 ounces. 99.7% fall within plus or minus 8 ounces.

LOW HEADROOM

Only 8 foot 4 1/2 inch headroom is required, measured from top of sewing conveyor to belt feeder inlet. This means minimum installation expense.

The 185-AS scale is typical of the packaging improvements St. Regis has developed to help the fertilizer industry achieve greater economy, efficiency and speed. Let us tell you more about St. Regis service to packers of both open mouth and valve bags, and how our complete Packaging Service can help you. Send in the coupon today.

Multiwall Packaging Division

Dept. AC857

St. Regis 
PAPER COMPANY
150 EAST 42ND STREET, NEW YORK 17, N.Y.

Please send me information about the 185-AS Scale, and St. Regis complete Packaging Service.

NAME.....TITLE.....
FIRM.....
ADDRESS.....
CITY.....STATE.....

facts you should know
about dryers . . .

**BUILDING A DRYER
TO ANSWER
YOUR DRYING PROBLEMS**

For over 55 years, Louisville Dryers have been solving industry's drying problems and effecting marked economies. The following is intended as an introduction to selecting the right type of dryer.

Q. Since my required production capacity indicates a continuous dryer will give lowest drying cost, which design is best for my purpose?

A. Assuming the material is in bulk form, a rotary type dryer is best for your purpose. It is almost axiomatic that materials suited to drying in rotary dryers are dried at lowest overall cost in that type.

Q. If I consider a rotary dryer, should it use high temperature furnace gases or low temperature warm air to dry my material?

A. This will depend on your particular material, for instance—

1. The temperature to which it can be heated without injury.
2. The amount of moisture in the wet material.
3. The material temperature necessary to dry the material to the desired final moisture content.
4. Whether or not the material will be contaminated by contact with combustion gases.

Q. I think my material will not be injured by gases from an oil furnace. Should I use a parallel or counter current rotary dryer?

A. This will depend on a number of considerations, such as:—

1. Is the material flammable?
2. How dry must the product be?
3. Is the dried product dusty or is it granular with very small percentage of "fines?"
4. Will "case hardening" occur in high temperature atmosphere inhib-

iting uniform and complete drying of large lumps and particles?

Q. There seems to be quite a number of conditions affecting the selection of the proper dryer type.

A. Very true. And the conditions involved are not all included in the above discussion by any means.

Q. How can I be sure of making the proper choice?

A. An experienced drying engineer knows how to evaluate the various conditions involved in each drying problem and will make a sensible recommendation. If advisable he will also recommend pilot plant tests to confirm his conclusions.

Q. How can I obtain such advice?

A. Submit your problem to General American. An analysis and recommendation by a LOUISVILLE engineer entails no obligation on your part.



LOUISVILLE DRYING MACHINERY UNIT

GENERAL AMERICAN TRANSPORTATION CORPORATION

Dryer General Sales Office: 139 So. Fourth Street, Louisville 2, Kentucky

Eastern Sales Office: 380 Madison Avenue, New York 17, New York

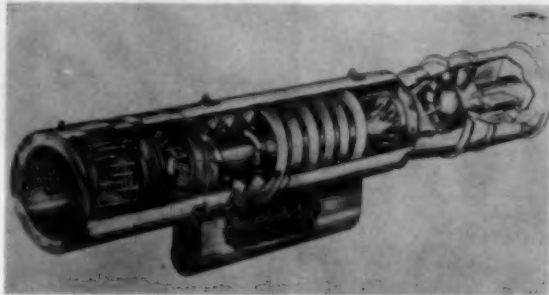
In Canada: Canadian Locomotive Company, Ltd., Kingston, Ontario, Canada

General Offices: 135 S. La Salle Street, Chicago 90, Illinois

Equipment, Supplies, Bulletins

New Joy Dust Collector For Existing Duct Work

The Joy Microdyne dust collector, manufactured by the Joy Manufacturing Co., Pittsburgh, Pa., is said to be one-tenth the size of comparable equipment and can be mounted in existing duct work at the point of use. The Microdyne is a wet inertial type dust collector made up of three double walled cylindrical sections. The sections contain a water spray and an impingement screen assembly, a water eliminator, and a transition section to



accommodate the Joy axial flow fan.

Prototype models are being tested under actual working conditions in mines and manufacturing and processing plants.

Field Trial Price List

Dr. G. R. Townsend, Belle Glade, Fla., is offering a booklet listing his prices for Florida Field Trials of agricultural chemicals. Included in the lists of tests available are: fungicide tests, seed treatment tests, tests of anti-viral agents, insecticide tests, nematocide tests, herbicide tests, and tests of plant hormones and nutrient materials.

The prices are effective as of July 1, 1957.

Protectant for Chem. Workers

A new skin protective coating, particularly useful to workers in fertilizer and farm chemical processing, consists of a plastic dispersed in gel form in a water base. When applied to the skin, the water base evaporates to leave a skin-hugging, continuous, elastic, plasticized film.

Ply no. 9 Gel, the new compound, is said to protect against skin irritation or dermatitis for a wide variety of the chemical and mechanical irritants to which fertilizer workers are exposed.

The plastic film barrier formed by the evaporation of the Ply Gel is impervious to phenols, hexanes, coal

tars, dry and oil-based insecticides, weed killers and crop dusts, to poison oak and poison ivy and to most organic solvents. It is attacked only by acetones and methyl and ethyl alcohols. It is soluble in water, and is not recommended against water-based irritants.

Mechanically tough, the plastic skin coating is not penetrated by abrasive dust, glass fibers or fine powders.

Ply no. 9 Gel is manufactured and distributed by Milburn Co., Detroit.

Equipment Slides Catalog

A catalog of 35 mm. slides showing fertilizer distribution equipment has been assembled by the National Joint Committee of Fertilizer Application and can be obtained from the National Plant Food Institute, Washington, D.C.

The slide library has been compiled principally for educational purposes such as farmers' meetings, classrooms, and sales meetings. Legends in the catalog identify the machines and provide brief descriptions that can be used by the person showing the slides.

Ag-2 Evaluation Continues

The Transland Co.'s new Ag-2 agricultural and forestry airplane is currently undergoing a complete engineering and mechanical evaluation. Minor modifications resulting from a recent series of flight tests are being incorporated and the entire airplane is being sealed for complete corrosion-resistance to agricultural chemicals.

Manufactured by the Transland Co., of Torrance, Calif., the airplane made its first flight test in October 1956 and in December it was used to help combat the Santa Monica Mountain fire in California.

Seed Treatment Booklet

An illustrated, 16-page booklet on modern seed treatment has been issued by Panogen, Inc., Ringwood, Ill.

The booklet contains sections devoted to wheat, oats, cotton, barley, flax, rice, and sorghum. Diseases and treating results are described for each crop and nearly 50 photos are included in the text.

Automatic Batch Control



A new, completely automatic control unit for batch-type processing of neutral solution liquid fertilizers has been introduced by Barnard & Leas Mfg. Co., Inc., Cedar Rapids, Iowa.

The "Autobatch" is self-contained and factory assembled.

*Russian
knapweed*



Austrian field cress



Bermuda grass



bindweed



leafy spurge



quack grass



hoary cress



Canadian thistle



Johnson grass

What's your one low-cost way to control them all?

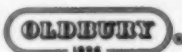
You can control the weeds shown here, plus all other weeds and grasses, with **OLDBURY®** sodium chlorate, manufactured by Hooker.

It is effective on germinating weed seeds as well as growing roots. Its sterilant effects last up to one year in most sandy soils; and from one to two years in many heavier soils. It gives these results at *lower cost* than any other chemical.

You're in good company when you recommend **OLDBURY** sodium chlorate for broad-spectrum weed control. For

years it has been first choice of many county agents in states where weed control is regulated by law.

Look for this trade-mark—it gives you these advantages...



Acceptance: Farmers have come to know and trust the **OLDBURY** label wherever it has been introduced.

Dependable service: Fastest delivery you can get in East and South—direct from the nation's largest producer of sodium chlorate. Two plants—Niagara

Falls, N. Y., and Columbus, Miss.—insure plenty of capacity to meet your needs in a hurry.

Technical help: You can use the services of full-time Hooker agronomists. They're equipped to help you plan weed control programs in your area; can advise you on handling, storage, and application of sodium chlorate.

You can get 99% pure **OLDBURY** sodium chlorate in steel drums, 100 and 350 lbs. net. For price and shipping information, write us today.

For controlling weeds on railroad right-of-way, you can get the skilled services of specialists who apply formulations made with **OLDBURY** sodium chlorate.

If you'd like names and addresses of these specialist firms, write us.

HOOVER ELECTROCHEMICAL COMPANY

608 Buffalo Ave., Niagara Falls, N. Y.



DUREZ® PLASTICS DIVISION • NORTH TONAWANDA, N. Y.
NIALK® CHEMICALS • NIAGARA FALLS, N. Y.
OLDBURY® CHEMICALS • NIAGARA FALLS, N. Y.

Sales Offices: Chicago, Ill.; Detroit, Mich.; Los Angeles, Calif.; New York, N. Y.; Niagara Falls, N. Y.; Philadelphia, Pa.; Tacoma, Wash.; N. Tonawanda, N. Y.; Worcester, Mass. In Canada: Hooker Chemicals Limited, N. Vancouver, B. C.

New Trailer Transport



A new trailer-mounted transport designed for hauling nitrogen solutions and liquid fertilizers from storage tanks to the farm and out to the field is being produced by General Metals, Inc., Greensboro, N. C.

The transport unit consists of trailer, saddles, tank, fittings, hose, gauges, air compressor, front end jack, trailer hitch, and all necessary equipment. The aluminum tank holds 1,000 gallons.

Tomato Pest Control Folder

The use of toxaphene insecticides, to control various insect pests which attack tomatoes, is described in a folder issued by the Hercules Powder Co., Wilmington, Del.

The leaflet discusses typical applications for the control of tomato hornworm, tomato russet mite, flea beetles, vegetable weevil, cutworms, tomato fruitworm, and blister beetles.

Clark Fork Truck Booklet

A six-page, four-color brochure describing the design, operation, and advantages of the Clarklift-30, a gas-powered 3,000 lb. capacity fork truck, has been prepared by the Clark Equipment Co., Battle Creek, Mich.

Drawings and photographs illustrate such features as a swing-up hood, one lever upright control, self-adjusting brake, and automatic hydrotork drive transmission.

Chemagro Formulator Manual

The Chemagro Corp., New York, has issued a formulator's manual dealing with Parathion Technical (ethyl parathion) and Nitrox 80 (methyl parathion 80%) which gives the physical and chemical properties of the insecticides, preparation methods for both liquid and dry formulations, and information on toxicity and medical treatment.

A 67-page loose-leaf manual, the book also lists packaging, labeling, and shipping regulations for both

insecticides and closes with some general safety suggestions for handling and applying the insecticides. The manual is intended to serve the formulator as a guide in the manufacture of parathion formulations.

Sturtevant Batch Blender

The Sturtevant Mill Co., Boston, has published a new rotary batch blender brochure which describes in detail how the Sturtevant four-way blending action produces highly intimate blends in one or two minutes.

Kennedy Minerals Booklet

The Kennedy Minerals Co., Los Angeles, has published a catalogue which includes technical data sheets for the more than 30 non-metallic minerals which comprise the Kenco line.

The booklet was prepared to aid chemists and manufacturers in evaluating and specifying Kenco products. The technical data sheets give each product's chemical and physical properties as well as its general characteristics and recommended uses.



TOP: This 8'-0 x 60'-0 rotary dryer removes excess moisture and completes the granulation. Dryer is oil heated.

RIGHT: The lifters, with their unique cup-like design and their staggered arrangement in the unit, cause the granules to be evenly distributed.

A McDERMOTT 8 x 60 DRYER INSTALLATION AT THE SAGINAW PLANT OF THE AMERICAN AGRICULTURAL CHEMICAL CO.

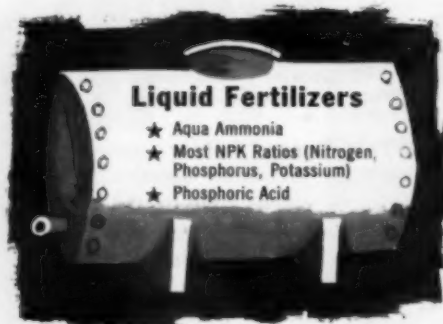
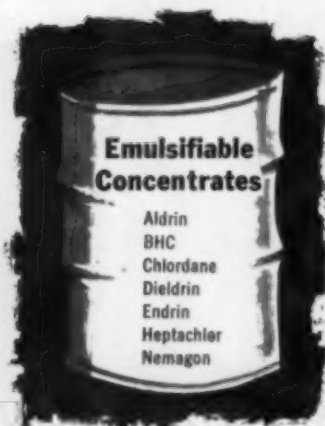
Sound Engineering Economy and Consistently Superior Performance Are Built Into All McDermott

DRYERS—COOLERS—AMMONIATORS

McDERMOTT BROS. CO.
Allentown, Pennsylvania

with practically no limitations

NOW! You Can Field Mix Liquid Fertilizers and Pesticides



with the Versatile **EMCOLS**

H-A

H-B

Emulsifiers

H-C

Further advantages of this novel system:

1. Emulsifiable pesticide concentrates are compatible in liquid fertilizers regardless of sources of NPK (Nitrogen, Phosphorus, Potassium).
2. Emulsions are easily formed with minimum agitation.
3. Maximum flexibility is provided for controlling pesticide-fertilizer dosages in mixed crop requirements.
4. Pesticide concentrates are also suitable for conventional aqueous spray applications in case of carry-over stock.

All these advantages make this novel system economically attractive to formulators.

Suggestion to Buyers of Insecticides:

For emulsifiable concentrates formulated with these Emcols, please contact your insecticide supplier.

serving many other industries with dozens of EMCOL emulsifying agents... especially the pesticide and herbicide fields.



EMULSOL CHEMICAL CORPORATION

division of Witco Chemical Company

Dept. AG-8 • 75 East Wacker Drive, Chicago 1, Ill.

News Brevities

SPENCER CHEMICAL CO., Kansas City, Mo., has announced that the production of urea is now underway at the company's Vicksburg, Miss., Works. The works were recently expanded to include the new product.

AC

A POLYTHENE SHIELD to cover a boom used for spraying hormone weedkiller has been designed at the National Fruit Trials Station at Brogdale Farm, Faversham, Kent, England. The polythene is on a light steel frame in two sections which fit one on each side of the tank. Both ends of the shield are sealed and some six inches of polythene drag along the ground.

AC

THE NEW YORK OFFICE of the United States Potash Co., division of United States Borax and Chemical Corp., has been moved to 30 Rockefeller Plaza. The former address was at 30 Rockefeller Plaza.

AC

MARTIN L. RICE and Robert W. Rech have been named technical sales representatives for the Northeast Agricultural Chemicals Division of Stauffer Chemical Co., New York. Mr. Rice covers central and eastern Pennsylvania and the northern portion of the Shenandoah Valley. Mr. Rech covers Ohio, north of Columbus, and several counties of western Pennsylvania.

AC

ANTHONY ANABLE has rejoined the staff of Dorr-Oliver, Inc., Stamford, Conn., as manager of the Technical Data Division.

AC

THE BAG COMMITTEE of the Packaging Institute, Inc., New York, has developed a test procedure for determining the roughness or smoothness of flat kraft paper for multiwall bags. Copies of the proposed procedure are available from the Packaging Institute at 25 cents each.

AC

DR. DMITRY N. BORODIN of Astoria, Queens, N.Y., a plant physiolo-

gist, died recently of a cerebral hemorrhage suffered June 11. His age was 67. Dr. Borodin was noted for his work on the "yarovization" or "vernalization" of plants.

AC

JOHN G. NECKERMAN was recently appointed a sales representative in North Dakota for the California Spray-Chemical Corp., Richmond, Calif. Mr. Neckerman, whose headquarters are at Fargo, N. D., was previously employed by the Pacific Coast Borax Co.

ROBERT G. SWAIN, manager of the Western district of the Multiwall Packaging Division of St. Regis Co., New York, died recently. He was 54 years old. Mr. Swain had been associated with St. Regis on the West Coast since 1928.

AC

R. L. WARING, JR., formerly manager of Baltimore sales for the American Agricultural Chemical Co., New York, has been named manager of fertilizer sales for the firm's New York office.



New Modern Plant Where SER-X is Produced

SER-X is a potassium hydrous alumina silicate of the following analysis: SiO_2 73.08%, Al_2O_3 13.70%, Fe_2O_3 3.12%, TiO_2 0.54%, CaO 0.30%, MgO 1.14%, Na_2O 0.22%, K_2O 5.42%, Ign. Loss 2.54%, Fusion Point Cone 12.

Processed from Sericite ore, SER-X has an average particle size of 3.5 microns and a bulk density of 40 pounds per cubic foot. SER-X is inert, non-hygroscopic and non-shrinking. The particles are flat. Because of these physical and chemical properties it has proved ideal as a diluent in the formulation of agricultural insecticide dusts.

For Technical Literature and Samples, Write Dept. AC 1

The SUMMIT of QUALITY*

The Test Proven
Insecticide Diluent



Formulators Report
Excellent Results

*Registered Trade Mark

SUMMIT MINING CORPORATION

BASHORE BUILDING

CARLISLE, PENNSYLVANIA



You pay less for this stronger thread for bags



"SUPER CORDURA" SEWING THREAD reduces bag breakage resulting from rugged handling, because seams are much stronger.



"SUPER CORDURA" can be sewn with smaller needles, preventing material losses caused by sifting.

HIGHLY EFFICIENT "SUPER CORDURA" REG. U. S. PAT. OFF. REDUCES BAG AND CLOSING COSTS

GREATER seam strength, increased sewing efficiency, lower cost—these are the advantages of sewing bags with Du Pont "Super Cordura"* high tenacity rayon.

Because "Super Cordura" is far stronger than ordinary fiber threads, danger of seam breakage is minimized—drop tests prove it. And because sewing with "Super Cordura" is more efficient, you save money in your closing operations. There are less breaks during closing; one thread does most jobs, reducing thread inventory.

Consider the advantages of bags sewn with Du Pont "Super Cordura" the next time you order multiwalls . . . and order it for use in closing, too.

E. I. du Pont de Nemours & Co. (Inc.), Textile Fibers Department, Wilmington 98, Delaware.

*"Super Cordura" is Du Pont's registered trademark for its high tenacity rayon yarns.



REG. U. S. PAT. OFF.

Better Things for Better Living . . . through Chemistry

**THREAD OF "SUPER CORDURA" . . . easier to sew
... costs less than conventional thread . . . extra-strong**

THE AGRICULTURE DEPARTMENT estimated that farmers grossed \$2 billion from the sale of farm products in May, compared with \$1.9 billion in April and \$2 billion in May, 1956.

AC

RAYMOND C. DOSTA, former assistant treasurer of the United States Borax & Chemical Corp., Los Angeles, has been named treasurer, succeeding R. F. Steel.

AC

ALBERT LA SALVIA has been appointed sales representative for the George H. Fry Co., Mineola, N. Y. Mr. LaSalvia was formerly with the Shellmar Betner Division of Continental Can Co. His territory includes the Eastern and Mid-Western sections of the country.

AC

STAUFFER CHEMICAL CO., New York, has been granted a comprehensive patent which covers the manufacture, composition, and use of a series of phosphate insecticides and acaricides. It is cited by the company as a basic patent on the development of Stauffer's insecticide, Trithion.

AC

BLAW-KNOX Co., Pittsburgh, producer of rolling mill equipment, last month entered into an agreement with the Krupp steel works of Essen, West Germany, whereby the German company will supply American designed rolling mills to India, Pakistan, and other foreign countries.

AC

ELECTRIC REDUCTION Co., a Canadian phosphate and chlorate chemicals producer, will build a \$5 million plant at Port Maitland, Ont., to make phosphoric acids by both the electrothermal and wet processes.

AC

ALLEN JOHNSON FERTILIZER & OIL Co., Inc., Benson, N. C., has been granted a State charter to deal in commercial fertilizers.

AC

JACK P. TAYLOR has been named manager of Industrial Chemicals Sales, a newly created position in the Agricultural Chemicals Division of the American Chemical Paint Co., Ambler, Pa.

AGRICULTURAL CHEMICALS

SCOTTISH AGRICULTURAL INDUSTRIES, a subsidiary of Imperial Chemical Industries, is marketing a new range of concentrated complete fertilizers known as S.A.I. C.C.F. No. 1, No. 2, and No. 3. The new range of fertilizers are being made at the company's new plant at Leith, which has been built on 12 acres of land reclaimed from the Firth of Forth.

WASHINGTON REPORT

(From Page 62)

Congress followed by the hearings held by Congressman Miller which resulted in the passage of the law bearing his name. Thousands of pages of testimony are part of the permanent record of the committees of congress and the food and drug administration. Vast masses of material are being submitted regularly by members of the industry as new materials and new uses are developed. Consequently, the industry believes it should not be involved in the current hearings on food additives.

The National Plant Food Institute also believes that it is not included in the scope of the food additive hearings, largely because all regularly used fertilizer materials are found in the soil and are normally used by plants. However as luck would have it, a slip on the part of a government official permitted publication of information citing the fertilizer industry as an example of why the problem of food additives should be explored. While this is being retracted, nonetheless it illustrates the necessity for having industry representatives in Washington working continuously with the Government.

* * * * *

Shed a tear for dear old Spring Lake, New Jersey—this year's meeting of the National Agricultural Chemicals Association may be the last held there for some time. So plan to attend the meeting September 4, 5 and 6th.

Beginning in 1958, the association will hold only one meeting per year. In all probability next year's meeting will be in Georgia, perhaps Augusta.

Financial considerations are high on the list of subjects to be reviewed

and discussed during this year's meeting at Spring Lake. Detailed discussions are expected on "How to get farmers to pay cash for Pesticides" and "The effect of increasing costs on Return on Investment." Then there's a "sleeper" in the form of Roswell Garst, a leading seed-corn dealer from Coon Rapids, Iowa. Better be on hand to hear him.

Several hours are scheduled for the "B and B boys"—Bohlen and Beal of Iowa State College are slated to tell more about how farmers get information on pesticides and how mass media, company salesmen, county agents and the extension specialists, and others influence the farmer's thinking about the use of pesticidal chemicals. While most of Bohlen and Beal's report will deal with their general findings, they are also expected to interpret their data to the pesticide field.

Latest farm radio news service release from the National Plant Food Institute, features four reports by agricultural leaders. According to Louis

H. Wilson the director of information, they are: 1. A. J. Berwick, president, American Society of Farm Managers and Rural Appraisers and senior vice-president Doane Agricultural Service on: "You Can't Afford Inefficiency in Farming." 2. Dr. H. C. Trelogan, president-elect, American Farm Economic Association and director of marketing research division U.S.D.A. on: "Marketing Soil Fertility." 3. Dr. M. T. Harrington, president American Association of Land Grant Colleges and state universities and Chancellor, Texas A & M College on: "Agricultural Research is more important now," and 4. Robert J. Bishopp, president, National Vocational Agricultural Teachers Association, Inc., on: "Efficient Farming Pays."

These reports, in the form of a double-faced radio platter, are distributed nationally and in Canada as a public service of the Institute.

* * * * *

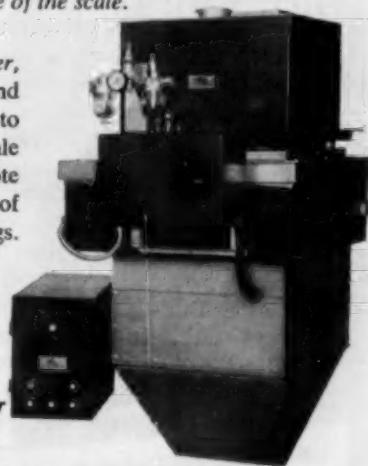
Another outstanding communications tool of the Plant Food Institute

Automatic weighing of FLOODING MATERIALS

Only Thayer Scales have the Thayer Plate Leverage System that is guaranteed accurate for the life of the scale.

Flooding powders, and even water, can be positively controlled and accurately batched or filled into containers with this Thayer Scale Autoweighting System. Remote controls permit quick changes of materials and weight settings. Amazing accuracy is retained regardless of shocks or surrounding dust conditions. Please write for engineering data.

MODEL B-36R Models available for batches from 5 to 5,000 lbs.



BATCHING • FILLING • CHECKING — AUTOMATICALLY BY WEIGHT

AUTOWEIGHTION

THE THAYER SCALE CORP., 4 Thayer Park, Pembroke, Mass.

tute is its "Plant Food Review," which just received a first award in the Annual Mid-Atlantic Association of Industrial Editors Publications contest. Delbert L. Rucker, Editor, accepted the award at the National Press Club. Also, he was elected president of the MAAIE for the coming year.

* * * * *

No public announcement is expected until the board meeting of the National Plant Food Institute scheduled for October 30 in Atlanta

on the outcome of the special five-man committee appointed by the institute to "evaluate the dues structure and to determine whether there are any inequities." This follows action by members of the Institute to double their financial support of the organization's fertilizer marketing expansion program.

The expansion will be based on two areas: research and education. Four regional offices also will be established. The expansion will be rapid, but over a period of several years.

Carrier COMPATIBILITY



Pikes Peak clay's exceptionally low moisture content and pH of 5 is your assurance of highest compatibility with malathion, methyl parathion, ethyl parathion or other phosphated insecticides.

Don't take chances with the stability of your finished product or concentrate. Use Pikes Peak clay. It is ideal for adjusting bulk densities in finished products and as a carrier for either phosphate or hydrocarbon concentrates. Pikes Peak clay also safeguards the free flowing characteristics of your product.

When you buy Pikes Peak clay you buy uniformity you can count on. It is ground to a fineness of 95% through 325 mesh. Of course, other sizes are available to meet your requirements.

Find out about Pikes Peak clay today. See what its unrivalled compatibility factor can mean to you in product quality. Write now for more information and prices.



GENERAL REDUCTION COMPANY

1820 ROSCOE STREET • CHICAGO 13, ILLINOIS

The U. S. Department of Agriculture's Office of Information is issuing several television kits to its list of approximately one hundred stations from coast to coast on the subject of pest control. One program is titled "The Spotted Alfalfa Aphid." The other is titled "The Soy Bean Cyst Nematode." You can expect more pesticide and fertilizer subjects to be covered in these features released by the Department as part of the new program whereby its service to television stations is doubled.

Each television feature consists of from ten to twenty still pictures along with a suggested script. Occasionally movie film are released and on occasion the materials for live demonstrations are forwarded to television stations.★★

PACIFIC ESA

(From Page 47)

ger can be reduced by using the slurry type of formulation in loading. A thick, mayonaise type of concentrated emulsion is probably the safest. It was brought out in discussion following Dr. Upholt's address that danger lies also in the aromatic hydrocarbons, which are sometimes used as carriers of the toxicants.

Significant endrin contamination was found only at relatively high levels of intake when the material was fed to livestock, reported Ulo Kiigemagi, L. C. Terriere, G. H. Arscott, D. C. England, and R. G. Sprowls, all of Oregon State College. The study was undertaken to determine how much endrin was deposited in milk, eggs, and certain body tissues when small amounts of endrin were eaten daily for several weeks by livestock.

Aerial spraying of 161,000 acres to reduce spruce budworm larvae in western Oregon forests did not reduce the effectiveness of primary budworm parasites, W. K. Coulter of the Pacific Northwest Forest and Range Experiment Station, Portland, reported.

Because of numerous advantages, aerial application of pesticides now is from 90 to 95% in liquid form, a

AGRICULTURAL CHEMICALS

panel discussing spray and dust formulations agreed. Sometimes only one ounce of actual material is required per acre, which makes a big difference in the payload a plane carries. Sprays have been able to control the cotton leaf perforator, which drove cotton from the Imperial Valley of California in 1921 and 1922. Sprays are better than dusts to control leafhoppers, and they are better in applying systemics. One or two ounces of Systox per acre gives "beautiful control" of the spotted alfalfa weevil, it was said.

However, in specific instances against certain pests, dusts are necessary, especially when the underside of the leaves must be reached. This is particularly true on cotton and against mites on melons, it was pointed out.

Mitox (p-chlorobenzyl p-chlorophenyl sulfide) when applied as a prebloom spray, controlled European red mites and clover mites on apples and pears for almost the entire season, according to Carl R. Tanner of Portland. The two species were also controlled effectively by summer sprays.

Satisfactory control of western tussock moth larvae on citrus in southern California was obtained with DDT, parathion, methyl parathion, Dilan, Sevin, Guthion, and Phosdrin among 20 pesticides that were tested by E. Laurence Atkins at the University of California experimental station at Riverside.

Schrader provided control for the longest period in tests made to reduce populations of the green peach aphid on potatoes, three experimenters from central Washington reported. Systemic and long residual contact insecticides were applied by B. J. Landis, Ralph Schoop, and E. C. Klostermeyer from the entomology research branch at Union Gap and the Washington State College Irrigation Experiment Station, Prosser. Generally poor control resulted during the period of aphid migration to the late potato crop, but results were more satisfactory after the migration slowed down.

Thimet sprays applied to the soil or to the foliage of strawberry plants were equally effective in controlling

aphids and two-spotted spider mites, according to J. Wilcox and A. F. Howland, USDA, Whittier. Granular Thimet in the soil was not so effective. On the other hand, granular Thimet in the soil was more effective than liquid soil applications, and just as effective as foliage sprays when used against aphids on turnips.

Pacific ESA members elected Leslie M. Smith, University of California, Davis, as chairman-elect. Dr. H. S. Telford, Washington State College, Pullman, and Dr. Hugh Manis, University of Idaho, Moscow, were elected to the executive committee. The 1958 meeting was announced for the El Cortez Hotel in San Diego, California, June 25 to 27. The national society will meet December 2 to 5 in Memphis, Tenn.

★★

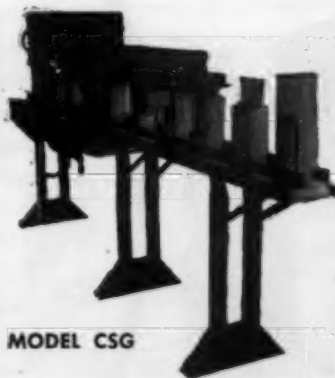
IDENTIFICATION

(From Page 34)

many other groups. Black flies are most readily identified by examination

of the pupal stage which, unfortunately, is seldom found by any except skilled collectors interested in black fly biology. Caterpillars and grubs are identified by examination of the arrangement, type, or presence or absence of setae on various parts of the body, and by study of other details of their anatomy. Many of the activities that must be completed prior to critical study of specimens, such as slide mounting, dissection, spreading of wings and so on, are laborious and add materially to the time and cost of making identifications.

The cost of making insect identifications may run from a few cents to several dollars each, depending upon the type and condition of the material available for examination and the complexity of the group to which the specimens belong. Very often the actual identification, after proper preparation of specimens, is a relatively easy task for the expert. On other occasions, even after prolonged study, only a partial identification can be made for example, to genus or species



MODEL CSG

The FRY MODEL CSG is a semi-automatic closing machine that double-folds, heat seals the inside of the bag and glues the second fold to the first. The result is a neat closure...heat-sealed for sift-proofness and glued for additional shipping or carrying strength. Operation is continuous and no reciprocating or cyclic motions are employed.

Adjustable for various bag heights. Model CSG also handles non-heatsealable bags by gluing folds.

FRY
SEALER-
GLUER
BAG CLOSING

Machine

Ideal for

- INSECTICIDES
- FERTILIZERS
- CHEMICALS
- PLANT FOODS
- BRIQUETS
- MISCELLANEOUS POWDERS
- GRANULAR PRODUCTS

Write for informative folder on this and other models. Please submit bag and product samples.

GEORGE H. FRY COMPANY

42 EAST SECOND ST., MINEOLA, N.Y.

TEL. Pioneer
6-6230

M·S·A... everything for protection against today's farm chemicals

RESPIRATORS



M.S.A. FARM SPRAY RESPIRATOR

The *one* Respirator that protects against Parathion, EPN, Dieldrin, Aldrin, TEPP, HETP, OMPA, and Systox. This extra protection is the result of accepted new-type filters, which are interchangeable with in-use Farm Spray Respirators. Light weight; comfortable. Accepted by the U. S. Interdepartmental Committee on Pest Control. Write for details.

M.S.A. DUSTFOE RESPIRATOR

Ideal for breathing protection in fertilizer manufacturing. Sturdy; light weight; tops in worker acceptance. Effective filtering action against dusts not significantly more toxic than lead. Write for details.

GAS MASKS

M.S.A. GREENHOUSE MASK (GMC-1)—Safeguard against Parathion, HETP, TEPP, and other organic phosphates.

M.S.A. HYDROCYANIC ACID FUMIGANT MASK (GMK)—For use in heavy concentrations of hydrocyanic acid gases.

M.S.A. ORGANIC FUMIGANT MASK (GMA)—Protection against Methyl Bromide, etc.

M.S.A. ANHYDROUS AMMONIA MASK (GMD)—Safeguard against ammonia vapors. All masks are accepted by U. S. Interdepartmental Committee on Pest Control. Write for details.



PROTECTIVE CLOTHING GOGGLES—FIRST AID

Complete line of protective clothing from suits to hoods. Also goggles, faceshields, and first aid material including the M.S.A. Anhydrous Ammonia Kit.



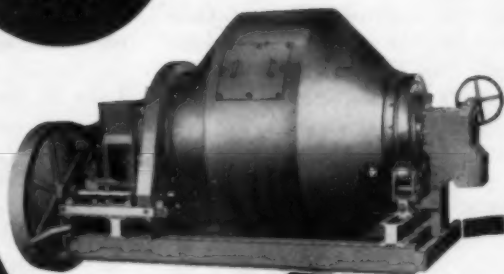
MINE SAFETY APPLIANCES COMPANY

201 North Braddock Avenue, Pittsburgh 8, Pa.

At Your Service: 82 Branch Offices in the U.S. and Canada

MUNSON ROTARY BATCH MIXER

Here's why more and more
MUNSONS are doing the
important mixing jobs



20 TO 250 CU. FT.
MIXING CAPACITY

- Munson Mixers will quickly blend various chemical compounds into a homogeneous, accurate mixture, with no reduction in particle sizes • They blend powders and granules • Spray pipes may be installed to spray liquids on dust and granular materials • Equipped with internal vent pipe to expel toxic fumes
- Drum may be heated or cooled
- Granular fertilizers can be coated with insecticide dust • Will blend chemicals, fertilizers, insecticides, herbicides, antibiotics, and many other materials • Available in several models . . . flexible design to meet your requirements • Low horsepower . . . lower operating cost

TELL US YOUR MIXING PROBLEMS . . . write or phone for the complete story on Munson Rotary Batch Mixers.

MUNSON MILL MACHINERY COMPANY
Dept. A-857, 210 Seward Avenue, Utica, New York

MUNSON

group because the material is inadequate or the group of insects poorly known. We estimate that the *average* cost, per identification, of the material received by the Federal unit is around one dollar, not counting the expense of preparing specimens and reporting identity. Dependence upon this method is a matter of expediency and economy. The cost of utilizing such methods as culturing, serology, paper chromatography, and so forth, even if those methods are proved superior, is prohibitive under the present standards of financial support.

Important as insect identifications are to our agricultural and public health operation, research on classification, including means of more readily identifying insects in all stages of development, is of even more concern to our over-all economy. Because related species tend to have similar habits, better knowledge of the inter-relationships of species is potentially of great value as a guide to their probable distribution, biology, and importance as pests or vectors of disease. It is therefore essential that present demands for the answer to "What is it?" not result in neglect of research that will supply the means of giving that information and making possible deductions based on knowledge of the relationships of species.★★

FERTILIZER VIEWS

(From Page 55)

soil solution (pH), total nitrogen, phosphorus, potassium, calcium and magnesium, but has difficulty with trace elements such as boron, manganese or zinc. Where laboratory facilities permit, he can test the soil during the growing season for "trouble shooting"; for example, a hunger symptom may indicate some abnormality attributable to a nutrient deficiency.

The season of the year has a bearing on the soil test because the importance of nutrients varies with the season. Testing for nitrate nitrogen and potash in the early fall on sandy soils in the humid region is wasteful of effort, since summer rains undoubtedly leach away most of these

soluble nutrients and the test would show an inadequate level.

Hence we see how complex is the interplay of chemical, physical and climatic factors in the productivity of a soil, and how difficult the interpretation of the analysis, assuming the sampling is really representative. Other factors include moisture relationships, nutrient-holding capacity of the clay and humus, nutritional balance among the various elements, knowledge of the plant requirements at different stages of growth, drainage, irrigation and season of the year. All these play a part in the feeding of a crop, and the information at our disposal regarding their inter-relationship with reference to different stages of growth is too limited for even the experts. We still lack adequate correlation of soil tests with actual crop responses for the major soil types in different climatic regions of the country.

So we believe it fair to state that to base a fertilizer recommendation on the results of a soil test alone is

not practical because such information is only a fragment of the total needed for the purpose. The nature of the soil, the requirements of the plant at different stages of growth, the nature of the errors in sampling and analysis must all be correctly evaluated or "weighed" before recommending a fertilizer. This is not to say that a good soil test made by a competent operator is a total loss. It can be a good compass to guide him through the many snares and difficulties.★★

CALCIUM PHOSPHATE

(From Page 32)

phosphate from a particular calcium phosphate in such a way that the P_2O_5 concentration in an extract is independent of the ratio of solid: solvent. Dr. Raistrick used a half neutralized acetic acid-sodium acetate solution containing ammonium oxalate as extractant; the concentration of the



FIRST with Aluminum Tanks for Nitrate Solutions

● COLE was first to build welded aluminum tanks for nitrate solutions, just as we have always pioneered in supplying the plant food industry with tanks or equipment for the storage or processing of agricultural chemicals. . . . Send us your inquiries for conventional or special design tanks—shop built up or field erected, using flat, flanged and dished, or hemispherical heads. Write for a copy of *Tanks and Equipment for the Plant Food Industry*.



Elevated Tanks, Pressure Vessels, Chemical and Processing Equipment from Aluminum, Stainless and Carbon Steel, Monel and Other Alloys.

Established 1854

R. D. COLE MANUFACTURING CO.
NEWNAN, GEORGIA

CALL ARMOUR
greatest name in fertilizers

**READY TO
SERVE YOU WITH**
31 factories
and offices

**PHOSPHATE ROCK • TRIPLE SUPERPHOSPHATE
SUPERPHOSPHATE • SHEEP MANURE**

ARMOUR FERTILIZER WORKS
GENERAL OFFICE, P.O. BOX 1685, ATLANTA 1, GEORGIA



Today's biggest bargain in Spreaders!
BAUGHMAN K-5 Series

• **YOUR CHOICE OF...**

- ... 3 Drives
- ... 3 Conveyors
- ... Single or Double Distributors

• **STRONGEST SPREADER BODY EVER BUILT!**

- ... Reinforced top edge
- ... Extended jacks for full side support
- ... Internal bracing

• **AT LOWER PRICES!**

Compare Quality and Prices ...
We have no Competition!

WRITE ...
for Illustrated Literature



BAUGHMAN MANUFACTURING COMPANY, INC.

132 Shipman Road • Jerseyville, Illinois.

acetate was about 0.0025M, and of the oxalate about 0.003M. The solution had an initial pH of about 5.0, thus little buffer capacity, but he thought that probably a rather low total salt concentration was more desirable than a high buffer capacity: Later this reasoning was confirmed in that a solution of 10 times the acetate concentration was found to be unsuitable for the purpose.★★

SMUT CONTROL

(From Page 36)

hexachlorobenzene 40 per cent and to the vapors of these same materials in the absence of moisture, and then planted in the greenhouse or in the field, only the cyano (methylmercuri) guanidine preparation controlled infection satisfactorily, although the N - (ethylmercuri-p-toluenesulfonamide) compound reduced it somewhat. The failure of hexachlorobenzene vapor to control smut in this test despite its highly effective action against spore germination in agar plates is believed to be due to the fact that this material is toxic to wheat smut spores only when they are germinating.

The results from vapor action studies may explain, at least partly, why the long-recommended post-treatment storage of treated grain causes little or no increase in the effectiveness of the treatment in the Pacific Northwest. This was apparent in the results of tests with seven seed treatment materials, including hexachlorobenzene 40 per cent and six mercury compounds. All of these materials gave essentially the same degree of control, whether the seed was planted immediately after it was treated or held in storage for varying periods of time up to 14 days and then planted.* These results might be expected, in view of the apparent mode of action of these fungicides.

Since vapor action does not enhance the degree of smut control afforded by any of the standard mercury preparations except cyano (methylmercuri) guanidine the toxic action of the other mercury treatments against smut spores must occur

through direct contact, which destroys the spores, even in dormancy. Hence, thorough coverage of the seed is essential if satisfactory control by these materials is to follow. Post-treatment storage probably would not enhance the end result except when the treatment failed to provide complete coverage of the seed and a volatile product like 2.2 per cent cyano (methylmercuri) guanidine was used. However, even this could not be demonstrated in the above tests in the Pacific Northwest.

In the case of hexachlorobenzene, which may be active against smut infection both by vapor action and by direct contact, but apparently only when the spores are germinating, no added protection would accrue from post-treatment storage. On the contrary, immediate post-treatment seeding might enhance the total effects of this material if the spores were brought to germination prior to any appreciable loss of toxicity through volatile action. While this is highly speculative, it seems to be in harmony with one theory on the mode of action of hexachlorobenzene in controlling soil-borne common bunt by seed treatment.* According to the above-cited theory, when treated seed is planted in smut-infested soil the hexachlorobenzene vapor produces an inoculum-free zone around the germinating seed, which, presumably, expands until all of the chemical has been exhausted by sublimation. The seedling escapes infection as long as it remains in this zone. In other words, the maximum potential protection by the hexachlorobenzene adhering to the seed can be realized only if the treated seed is brought into the smut-infested zone as soon as possible, so that the chemical adhering to the seed can be brought to bear against the inoculum in the infested zone before its total volatile potential is reduced. Obviously, however, much is yet to be learned about the mode of action of hexachlorobenzene in controlling wheat smut so effectively in the Pacific Northwest. Perhaps additional facts will be revealed by basic research on this action now underway in this region.★★

* Plant Disease Reporter 40: 878-891, 1956.

* Phytopathology 47: 28, 1957.



**specialists
in magnesia
for agriculture**

EMJEO (80/82% Magnesium Sulphate) Calcined Brucite (fertilizer grade) 65% MgO

POTNIT

(95% Nitrate of Potash) for Special Mixtures and Soluble Fertilizers • Other Fertilizer Materials

**Insecticides
Fungicides**

EXPORT

•
IMPORT

**Berkshire
Chemicals**

INC.

420 LEXINGTON AVE., NEW YORK 17, N.Y.
BOSTON • CHICAGO • CLEVELAND
PHILADELPHIA • SAN FRANCISCO

Quality?

IT'S IN THE BAG!



REPUBLIC SULPHATE OF AMMONIA

Top-quality Republic Sulphate of Ammonia is available bagged for direct application, or by carload lot in bulk form for mixing your own blends of high-nitrogen fertilizer.

And because Republic is one of the largest producers of Sulphate of Ammonia, you are assured of prompt delivery at regularly scheduled intervals to meet your requirements.

Order Republic Sulphate of Ammonia today. Call or write:

REPUBLIC STEEL

GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.



Books for Sale

Soils and Fertilizers

by F. E. Bear

375 pages, price \$6.25

This text presents the basic scientific facts and principles behind the production and utilization of agricultural chemicals. The why, when, where and how of fertilizers is expressly discussed, with particular emphasis on the importance of lime and fertilizer materials in maintaining and increasing the productivity of soils.

Chemistry and Uses of Insecticides

by E. R. de Ong

445 pages, price \$8.25

Written by an outstanding student of entomology and agricultural technology, this book covers all the major insecticidal agents in detail, describing not only their chemical nature and properties, but also their specific action on various types of insects, their methods of application, and their effect on animals and humans.

Soils and Soil Fertility

by L. M. Thompson

330 pages, price \$5.25

This authoritative treatment begins by telling what soil is — what makes it up physically, chemically, biologically — and what its moisture-holding characteristics are. The use of commercial fertilizers and farm manure are other subjects under discussion.

Order direct from
Agricultural Chemicals
P. O. Box 31
Caldwell, New Jersey

EDITORIAL

(From Page 26)

Their view is that the season is simply late, because of the unusual rain pattern, that the pessimistic attitude of many in the field is by no means justified, and that the 1957 market may just be delayed.

Frequent, moderate, scattered rains over the balance of the growing season admittedly could do a lot to save the crop picture this year, and the hides of pesticide and fertilizer mixers and dealers as well. But as one observer noted, if they're coming, it better be mighty soon!

REX BLANKENSHIP has been named manager of the Muskogee, Okla., manufacturing plant of the Consumers Cooperative Association.

PROTECTANTS

(From Page 29)

Farmer cooperators have heartily approved the use of protective sprays and powders. Many have continued to use them and were instrumental in inducing their neighbors to do the same. But, in general, farmers have been slow in accepting the protectant treatments. This is explained in considerable measure by the farmer's natural reluctance to spend money for a prevention treatment when, for so long, their thinking has been geared to control rather than protective measures. However, as the clean grain program gains momentum and as increased pressures for clean grain are applied to farmers by elevator operators, the prevention treatment should gain favor rapidly. In fact, protective sprays and powders are the only insecticidal measures now available to protect much of the great volume of grain in emergency storage on the farm.★★

1956 FUNGICIDE TESTS

(From Page 49)

EDB, ONCB, or Vapam. Good control of the bulb nematode of onions was secured with 50 gallon applications of DD on several farms in New York. The use-

fulness of soil fumigation promises to continue expanding.

PCNB was found to control wirestem of crucifers as well as the old mercury treatment at transplanting time. When mixed with captan and sprayed into the furrow it controlled rhizoctonia stem rot of bean in California.

Kemate, now Dyrene, continued to give outstanding control of tomato and onion foliage diseases, alternaria, phoma, streptophyllum, botrytis.

In Florida it was found that diclone, ferbam, and thiram gave good control of botrytis grey mold and rhizoctonia ground rot of tomato and that the nabams and their metal salts and the ethylenebis dithiocarbamates actually increased these diseases.

Better control of foliar nematodes of chrysanthemums with sprays of Chlorothion than with less safe or less convenient materials is reported in New York and the importance of the location of the chlorine atom on the ring is mentioned.

An analogue of Captan (877) gave much better control of black spot of roses than Captan 50 in Ontario, Canada.

Maneb gave best all round control of several diseases and yields of watermelon in Florida and indeed of several vegetable diseases in the South and in the North and on potatoes.

In seed treatments for bunt control on wheat a number of new materials have made a good showing in Oregon and Idaho.★★

TABLE 98
Control of Cercospora Leaf Blight of Roses in Texas (52)

Fungicide	Rate	Control Rating	Yield Rating	Exper. Pref.
maneb spray	1.5 lbs./100 gal.	1 S	1	1
sulfur-copper dust	20 lbs. + /acre	2 S	2	2
captan spray	1 lb./50 gal.	3 S	3	3
maneb 8% dust	20 lbs. + /acre	4 S	4	4
Omazene spray	1 lb./50 gal.	5 S	5	5
captan 4% dust	20 lbs. + /acre	6 U	6	6
captan 7.5% dust	20 lbs. + /acre	7 U	7	7

HANDBOOK OF INSECTICIDE DUST DILUENTS AND CARRIERS

THE original publication "Properties and Commercial Sources of Insecticide Dust Diluents and Carriers" prepared by T. C. Watkins and L. B. Norton of Cornell University has been brought up to date and completely revised by Drs. Weidhaas and Brann. The new edition contains commercial information as well as data obtained in research conducted at Cornell University, Ithaca, New York.

The book is bound in a flexible leatheroid cover, for handy, practical use.

TABLE OF CONTENTS

Botanicals	Vermiculite
Sulfur	Talc
Tripolite	Pyrophyllite
Diatomite	Montmorillonoid Group
Calcium Limes	Kaolinite Group
Magnesium Limes	Attapulgite Group
Calcites	Unidentified Clays
Dolomites	Phosphates
Gypsum	Indeterminates
Mica	Synthetics

Postpaid if check sent with order

TEAR OFF AND MAIL

DORLAND BOOKS
P. O. Box 31
Caldwell, N. J.

250 Pages
\$4.75 in U.S.A.
\$5.25 elsewhere

Enclosed is our check for \$4.75 (Canada and Foreign, \$5.25) covering a copy of the HANDBOOK OF INSECTICIDE DUST DILUENTS AND CARRIERS. It is understood that we may return the book within ten days for a full refund.

Name
Company
Address
City and State

LIQUID FERTILIZER MANUFACTURERS

Increase your sales by adding Aldrin or other soil insecticides to your product. Give your customers control of Soil Insects as well as fertilization at time of application.

Durham Chemical Company offers you a tailor-made product for this purpose.

DURHAM ALDRIN EMULSION 43%

It mixes easily with any acid fertilizer whose pH is within the range of 4-8. The mixture is stable and long lasting.

Many leading liquid fertilizer companies depend upon Durham for this product

Write for circular, prices and sample.

DURHAM

CHEMICAL COMPANY

4124 E. Pacific Way

Los Angeles, California

ANgelus 3-3805

Thanks
for your
welcome
**FAN
MAIL**



Your
orders and
reorders are
the proof that
this is the
KAOLIN for you

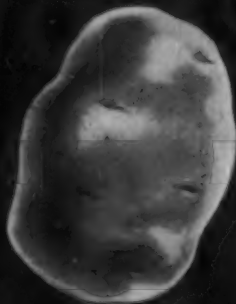
ALWAYS ECONOMICAL • ALWAYS DEPENDABLE • PROMPT DELIVERY
ORDER DIRECT

BELL KAOLIN CO.

Batesburg, South Carolina

ALWAYS UNIFORM HIGH QUALITY

YOU'LL GET GREATER YIELDS...
GROW MORE 'I'S...



THANKS TO CHEM-BAM'S EXCLUSIVE
NEW STICKING AGENT!



Chem-Bam
with
U-101

Never before a blight fighter like Chem-Bam! The only fungicide with U-101, exclusive sticking agent that glues fungicide to vines, plants. Not even rain or watering can wash away Chem-Bam.

Result? Your crops get fullest protection. You make full profits. Plants are healthier. Yields per acre 10% greater, according to a leading agricultural college.

Easier to use. Mixes evenly, easily with water and insecticides. Gives finer distribution in area sprayed.

Contact your farm dealer or write:

**CHEMICAL
INSECTICIDE CORP.**
129 Montague Street
Brooklyn 1, N. Y.
Phone: ULster 2-5200
Plant - Metuchen, N. J.



Free booklet on blight control on request.



Biological evaluation of insecticides
Screening of compounds for insecticidal, fungicidal, and bactericidal properties
Flavor evaluation of pesticide-treated crops
Bio-assay of insecticide residues on crops
Chemical determination of insecticides
Pharmacology including warm-blooded toxicity studies
Warfarin assays — physico-chemical and biological
Other biological, chemical and microbiological services

PROJECT RESEARCH
AND CONSULTATION
Write for Price Schedule

**WISCONSIN
ALUMNI
RESEARCH
FOUNDATION**

P.O. BOX 2217 • MADISON 1, WIS.

PROFESSIONAL DIRECTORY

ALVIN J. COX, Ph.D.

Chemical Engineer and Chemist

(Formerly Director of Science, Government of the Philippine Islands. Retired Chief, Bureau of Chemistry, State of California, Department of Agriculture.)

ADVISEE ON AGRICULTURAL CHEMICAL PROBLEMS AND INVESTIGATIONS

Consultant in reference to spray injury and damage, claims, including imports of fruits and nuts, formulas, labeling, advertising and compliance with law.

1118 Emerson Street
Palo Alto, California

FLORIDA FIELD TRIALS

Evaluations

of

Agricultural Chemicals.

DR. G. R. TOWNSEND

Box 356

Belle Glade, Florida

Sperling Laboratories

Toxicology — Pharmacology

Physiology

Frederick Sperling, Ph.D.

Formerly Pharmacologist-in-Charge

Pharmacological and Rodenticide

Laboratory

U. S. Department of Agriculture

2170 N. Glebe Rd. Arlington 7, Va.

Theodore Riedeburg Associates

Sales Consultants

and

Manufacturers' Representatives

on

Agricultural Chemicals

415 Lexington Ave.

New York 17, New York

Murray Hill 7-1488

FRIAR M. THOMPSON, JR.

Consultant

Specializing in insecticides, rodenticides, fungicides, weed controllers for industry, household, and farm.

Product formulation, testing, labeling.

Athens, Georgia

RESEARCH, ANALYSIS

CONSULTATION

Toxicology, Pharmacology, Bacteriology, Biochemistry, Chemistry, Nutrition, Radiochemistry.

New Price Schedule Available

3755 Forest Park Avenue

SCIENTIFIC ASSOCIATES

St. Louis 8, Missouri

Jefferson 1-5922

ANALYSES

Chemical Engineering,
Research & Development

Agricultural Chemical Analyses:
Insecticides, Fungicides, Herbicides, Rodenticides, Fertilizers.
Toxicology. Market Research.
Product Development.

Ask for complete details; call —

Watkins 4-5886

or write to:

SNELL

Foster D. Snell, Inc.
29 W. 15th STREET
New York 11, N. Y.

SOIL & PLANT TESTS

SOIL FERTILITY PROBLEMS

EVALUATION OF

AGRICULTURAL CHEMICALS

Dr. Wolf's Agricultural Laboratories

2620 Taylor St.

Hollywood, Fla.

Have you a service to sell?

Are you a consultant . . .

a representative?

a salesman?

Offer your talents, your services,
your facilities in the agricultural
chemical industry's only profes-
sional directory.

Advertising rates on request.

N.Y. Phone: Barclay 7-7121

Caldwell, N. J.: Caldwell 6-5520

AGRICULTURAL CHEMICALS

P.O. Box 31

Caldwell, N. J.

this space reserved for

your advertisement

Make yourself
known throughout
the industry

AC on Microfilm

All issues of AGRICUL-
TURAL CHEMICALS are
available on Microfilm.

Librarians and other interested
subscribers can contact University
Microfilms, 13 North First Street,
Ann Arbor, Mich., for price in-
formation and copies.

Spring Lake, N. J.

**the
essex and sussex**

**NAC association
24th annual
Meeting**

September 4, 5, 6

"What Motivates Farmers to Buy"

**three hours of thought-provoking
discussion on how to increase sales**

— NOTICE —

This will be the last meeting to be held in Spring Lake for a number of years. Under the new policy established by the Board of Directors, the NAC Association will hold only one meeting a year and this meeting will be transferred to various sections of the United States.

For Reservations:

**THE ESSEX AND SUSSEX
SPRING LAKE, N. J.**

For Details:

the Executive Secretary

**NATIONAL AGRICULTURAL CHEMICALS ASSOC.
1145 19th N.W., WASHINGTON 6, D. C.**

CLASSIFIED ADVERTISING

Rates for classified advertisement are ten cents per word, \$2.00 minimum, except those of individuals seeking employment, where the rate is five cents per word, \$1.00 minimum. Check must accompany all classified advertisements. Address all replies to Classified Advertisements with Box Number care of AGRICULTURAL CHEMICALS, P. O. Box 31, Caldwell, N. J. Closing date: 10th of preceding month.

For Sale:

FOR SALE: Ribbon Mixers 56 & 336 cu. ft. Dewatering Presses Louisville 8-Roll 36"; Steam Tube Dryers 4' x 30"; Hammer Mills JB #4 model W, 75 HP; Steel Tanks 4,300 gal. to 10,000 gal. Perry Equipment Corp., 1428 N. 6th St., Phila. 22, Pa.

Miscellaneous:

Want representation in Queensland? Established agricultural chemical firm in Brisbane will give thorough representation. Some statistics include: 1 million acres of cropland, 6500 sugar growers, 31 sugar mills, 25 million livestock. Address Box 172, c/o Agricultural Chemicals.

Situations Wanted:

ENTOMOLOGIST: Desires to represent major manufacturer of Agricultural Chemicals for the South Texas and Northern Mexico areas. Address Box 170, c/o Agricultural Chemicals.

President, Agricultural Chemical Manufacturing Company, with 15 years experience, research development, sales and management, desires position in management or sales in foreign fields. Experience in South America and Africa. Chemistry, Entomology, Plant Pathology, Doctorate training. Address Box 171, c/o Agricultural Chemicals.

Help Wanted:

"AGGRESSIVE SALESMAN WANTED—with acquaintance in Upper Mississippi Valley area among the Grain, Feed and Seed trade. Age 25-40, good health, free to travel. Opportunity for right man." Address Box 173, c/o Agricultural Chemicals.

1956 FUNGICIDE TESTS

The complete results of 1956 fungicide tests, listing response of various crops to commercial and experimental fungicides, are contained in a bound booklet.

PRODUCTION SUPERVISOR — Granular fertilizer plant. Permanent position in expanding facility. Midwest area. Send brief resume of education and experience. Address Box 174, c/o Agricultural Chemicals.

Price: \$1.00

Postpaid if check accompanies order—postage and handling charges added where orders must be billed.

Send check with order to:

Dr. A. B. Groves
Department of Plant
Pathology and Physiology
Agricultural Experiment
Station
Winchester, Virginia

GLENDON

INSECTICIDE GRADE PYROPHYLLITE

*the ideal diluent and extender
for AGRICULTURAL INSECTICIDES*

Dusts compounded with Glendon's Insecticide Grade Pyrophyllite will not absorb moisture, nor will the carrier separate from the active ingredients during storage. It holds well on plant leaves even during rain, and when dusted from the air, settles rapidly, minimizing drift.

pH 6 to 7	Wt.—30 lbs. per cu. ft.
92 to 95% will pass a 325 mesh screen	Aver. particle size below 5 microns
Non-alkaline and chemically inert	

GLENDON PYROPHYLLITE COMPANY

P.O. Box 2414
Greensboro, N. C.

Plant and Mines
Glendon, N. C.



*higher
yield*

RICHFIELD TOXISOL B

You'll get greater solvency
—and cut costs—
with this perfect base.
For tests, specifications
and prices, write to:

RICHFIELD OIL CORPORATION

Special Products Dept.
555 South Flower Street
Los Angeles 17, California



• A. B. of Two Dot, Mont., writes: "My tired budget was pepped up like new again with a concentrated schedule in *Agricultural Chemicals*."



• C. D. of Black Wolf, Neb., writes: "I cured a nagging boss in only two months with *Agricultural Chemicals*."



• E. F. of Peapack, N. J., writes: "A. B. and C. D. are pikers!"



AGRICULTURAL CHEMICALS
Leader in the Ag Chemicals Field
Caldwell, New Jersey

- ☐ Please rush information on the market and the magazine!
- ☐ Please rush rate card and contract blank!
- ☐ Please rush salesman!

Name

Company

Address

Make *Big* Profits in '57!

Raise GIANT Budgets

(In your spare time)

By learning how to buy Advertising Space

*Giant Budgets are friendly and clean to keep around the office. If your advertising budget is small and puny—chances are it's because you haven't handled it in a way to bring results—and help it grow. (And, if you can't handle a little budget, it's a cinch the boss won't buy you a big one!)

IF YOU PICK ON IT—IT WON'T GROW!

One way an advertising space buyer picks on his budget is to cut it up in little pieces and scatter it around in every magazine that has the word "chemicals" vaguely connected with it. Or, he gets on the right track and concentrates in one magazine—but picks the wrong one.

HOW TO RAISE GIANT BUDGETS

Concentrate your advertising in the one strongest magazine in the field—where the customers who really count will read your sales message month after month after month. And the strongest magazine is easy to judge. Just make a check chart on all the points on which two magazines can be compared!

1. Most Editorial Material
2. Most ABC Paid Circulation
3. Most Advertising Acceptance
4. Most Readership
5. Lowest Cost Coverage
6. PRESTIGE

It only makes sense to concentrate
In the strongest book—**AGRICULTURAL CHEMICALS**

Mail this coupon NOW!

(Nothing down and 12 easy payments
of only \$160 per month)



AGRICULTURAL CHEMICALS

INDEX to ADVERTISERS

American Agricultural Chemical Co.	44	Floridin Co.	July	Nitrogen Div., Allied Chem. & Dye Corp.	Between 66-67
American Cyanamid Co.	48	Fry Co., Geo. H.	93	Olin Mathieson Chemical Corp.	July
American Potash & Chemical Corp.	July	Fulton Bag & Cotton Mills	72	Penick, S. B. & Co.	70
Antara Chemical Div., General Aniline & Film Corp.	24	General American Transportation Corp.	84	Pennsylvania Salt Manufacturing Co.	June
Armour & Co.	96	General Chemical Div., Allied Chemical & Dye Corp.		Penola Oil Co.	60
Ashcraft-Wilkinson Co.	4	General Reduction Co.	92	Phelps Dodge Refining Corp.	68
Atlas Powder Co.	July	Glendon Pyrophyllite Co.	103	Phillips Chemical Co.	July
		Glenn Chemical Co.	15	Potash Company of America	3rd Cover
Baggpak Div., International Paper Co.	3	Grand River Chemical Division of Deere & Co.	July	Powell, John & Co.	July
Baughman Manufacturing Co.	96	Greeff & Co., R. W.	July	Prentiss Drug & Chemical Co.	20
Bell Clay Co.	100	Grinnell Co.	July		
Bemis Bros. Bag Co.	25	Heckathorn United & Co.	18	Raymond Bag Corp.	16
Berkeley Chemical Corp.	97	Hercules Powder Co.	4th Cover	Raymond Division, Combustion Engineering, Inc.	14
Blaw Knox Co.	June	Hooker Electrochemical Co.	86	Republic Steel Corp.	98
Blue Valley Engr. & Equip. Mfg. Co.	June	Hudson Pulp & Paper Corp.	June	Renneburg & Sons Co., Edw.	July
Bonneville, Ltd.	June	Huber, J. M. Corp.	June	Reideburg, Theodore Associates	101
Bradley & Baker	June			Richardson Scale Co.	July
Bradley Pulverizer Co.	22	International Minerals & Chemical Corp.	12, 13	Richfield Oil Corp.	103
		International Ore & Fertilizer Corp.	July	Shell Chemical Corp.	June
Carbide & Carbon Chemical Co.	July	Johns-Manville Co.	59	Sinclair Chemicals	July
Chase Bag Co.	July	Johnson, C. S. & C.	July	Snell, Foster D., Inc.	101
Chemical Insecticide Corp.	100	Kraft Bag Co.	7	Southeastern Clay Co.	June
Chemagro Corp.	76	Ludlow-Saylor Wire Cloth Co.	June	Southwest Potash Corp.	8
Clark Equipment Corp.	July	Lummus Co.	June	Spencer Chemical Co.	6
Climax Molybdenum Co.	74	Magnet Cove Barium Co.	9	Sperling Laboratories	101
R. D. Cole Mfg. Co.	95	McDermott Bros.	87	Spraying Systems Co.	July
Columbia Southern Chemical Corp.	June	Merck & Co.	June	Standard Oil Co. (Indiana)	July
Combustion Engineering, Inc. Raymond Division	14	Michigan Chemical Corp.	June	Stauffer Chemical Co.	June
Commercial Solvents Corp.	June	Minerals & Chemicals Corp. of America	10	St. Regis Paper Co.	82
Continental Can Co., Shellmar Belner Div.	54	Mine Safety Appliances Co.	94	Sturtevant Mill Corp.	June
Cox, Dr. Alvin J.	101	Mississippi River Chemical Co.	June	Summit Mining Corp.	89
		Monsanto Chemical Co.	July		
Davison Chemical Co., Dept. of W. R. Grace & Co.	52	Munsen Mill Machinery Co.	94	Tennessee Corp.	July
Diamond Alkali Co.	46			Texas Co.	56
Darr-Oliver Co.	63	National Aniline Division	June	Texas Gulf Sulphur Co.	80
Du Pont de Nemours & Co.	64, 90	National Kaolin Products Co.	July	Thayer Scale Co.	91
Durham Chemical Co.	100	National Lime & Stone Co.	June	Thomas Alabama Kaolin Co.	June
Duval Sulphur & Potash Co.	4	National Potash Co.	2nd Cover	Thompson, Friar M., Jr.	101
		National Agricultural Chemicals Assn.	102	Townsend, Dr. G. R.	101
Eastman Chemical Products, Inc.	June			Tractomotive Corp.	June
Emulsol Chemical Corp.	88				
				Union Bag-Camp Paper Corp.	23
Fairfield Chemical Div., Food Machinery & Chemical Co.	17			U. S. Industrial Chemical Co.	78
				U. S. Phosphoric Products, Div. Tennessee Corp.	19
				U. S. Potash Co.	21
				Vanderbilt Co., R. T.	June
				Velsicol Chemical Corp.	27
				Wisconsin Alumni Research Foundation	100
				Dr. Wolf's Agricultural Labs.	101
				Woodward & Dickinson, Inc.	July
				Young Machinery Co.	June
				Zenolite Co.	June

TALE ENDS

THE June 1957 issue of the Kiplinger Magazine gives liquid fertilizers a rather thorough going over, setting the facts straight on how relatively costly liquid plant foods are as compared with the less glamorous solid forms of fertilizer, and emphasizing that while the liquid products are often dramatic in their rapid action they can't be expected to work miracles. A pound of plant food in liquid form, says the Kiplinger article, "Costs

ten, to twenty times more. You pay heavily for the privilege of buying it in small containers instead of in bulk, and for the novelty of being able to squirt or pour it instead of having to broadcast it by hand or apply it with a spreader.

AC

Entomologists were celebrating last month the 100th anniversary of the birth

of Leland O. Howard, one of the most famous entomologists of all time. Howard was born June 11, 1857 in Rockford, Ill., but his parents soon moved to Ithaca, N. Y., where he grew up. He headed the Division of Entomology in the U. S. Department of Agriculture for many years, retiring in 1927. In addition to his administrative work he found time to author more than 900 articles and books on entomological subjects.

AC

If you haven't made your reservations yet for the September 4-6 meeting of the National Agricultural Chemicals Association, at Spring Lake, N. J., it's time to get on the ball. Scene of NAC's fall meetings for the past fourteen or fifteen years, this will apparently be the final convention at the Essex and Sussex for some time to come. The program for the future is to drop the spring meeting and move the fall session around the country each year. Gourmets among the NAC membership will miss that well-known luncheon delicacy, popularized for years by the E & S culinary staff, corn flakes and bananas.

AC

Early Sunday morning risers can find entertainment along with information on the NBC television show "The Modern Farmer," shown at 7 AM on Channel 4. Early in July, the program ran the NPFI film "What's Up." Miss Beulah Jarvis, who selects films for showing on the program draws on scripts and films, working with the trade associations, USDA, and commercial companies for source material. Companies wishing to offer films for showing on the program, can send her an outline of their movie, time of running, etc. She is located at WRCA-TV, 101 West 67th St., New York City.

AC

The general exodus move to the suburbs has been accompanied by garden supply departments in ten-cent stores, drug stores, super markets, hardware stores. Consequently, the owners and clerks have been thrown into the authoritative position of recommending to their customers what product to use to "kill the bugs on tomatoes," and what to do "to remove the white powder from soil in flower pots."

We had occasion to visit a series of such stores recently in a fruitless search for a simple straight fungicide, being willing to settle if necessary just for some sulfur dust. We were particularly impressed by the general lack of knowledge of sales personnel of these stores of even the simplest facts about garden products. Practically without exception the sales clerks we talked to assured us that insecticides they showed us would handle the job nicely. Must have been a big early season business on fungicides, for there were none left in stock.

We wonder at the enormity and the practicality of the job if we insist on educating everyone who sells agricultural chemical products.

Keep Selling in the Summer



JUST because the weather is hot, it's no time to slack off and let your competitors get the jump on you. And one good way to keep your sales program rolling is with a consistent advertising program through the summer months. This issue is full of smart advertisers who are continuing to make sales. Are you?

AGRICULTURAL CHEMICALS

Caldwell

New Jersey

Member Audit Bureau of Circulations

GIANT SERVANT OF AGRICULTURE

Use the Best!

P.C.A. Muriate is ideal in plant operation — uniform in color — uniform in analysis — uniform in grain size.

New 60% Standard Muriate
New 60% Special Granular Muriate
New 60% Coarse Granular Muriate
Sulphate of Potash
Chemical Muriate

Quick Service — High Quality
Phone, write, telex, or wire us.

Phone STerling 3-4990, Washington
TWX No. — WA-331



POTASH COMPANY OF AMERICA CARLSBAD, NEW MEXICO.

General Sales Office . . . 1625 Eye Street, N.W., Washington, D.C.
Midwestern Sales Office . . . First National Bank Bldg., Peoria, Ill.
Southern Sales Office . . . Candler Building, Atlanta, Ga.

*Announcing
a New Agricultural
Pesticide*

DELNAV*
(Formerly Hercules 528)

*Trademark



After three years of extensive field tests, Delnav—a new phosphate pesticide—will be commercially available in limited quantities this year.

With indicated effectiveness in controlling a wide range of crop pests, this unusually long-lasting pesticide has already been recommended by various state authorities for use on cotton. Test results have also demonstrated the usefulness of Delnav on citrus and deciduous fruits, grapes, vegetables, and ornamentals as well as control of cattle ticks.

Developed at Hercules' Research Center and Agricultural Chemicals Laboratories, Delnav has been evaluated by Hercules, the United States Department of Agriculture, and various state agricultural research laboratories. Among the insects it controls are leafhoppers, thrips, leaf miners, and mites of various types. The effectiveness of Delnav is shown by the fact that it not only destroys adults but also the eggs of mites.

Delnav will be available in dusts or sprays in the near future. Additional information on this new product can be obtained by writing to Hercules.

HERCULES

*Agricultural Chemicals Division
Naval Stores Department*

HERCULES POWDER COMPANY

INCORPORATED
900 Market Street, Wilmington 99, Del.

HN57-1B